This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Stanford University Libraries
3 6105 005 079 863

NT OF EDUCATIO
LELAND ST RD JUNIOR UNIVERSI

ARITHMETIC READER

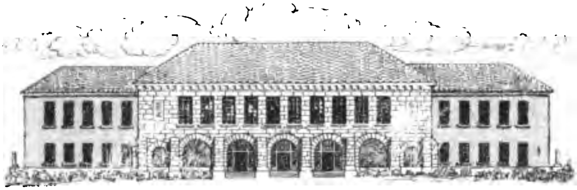
FOR THIRD GRADE

BY
FRANK H. HALL

SCOTT, FORESMAN & CO.
CHICAGO

TX
511.1
H175R
1899

PRESENTED BY THE PUBLISHERS
—TO THE—
TEXT-BOOK COLLECTION
OF THE



SCHOOL OF EDUCATION
LIBRARY

TEXTBOOK COLLECTION
GIFT OF
THE PUBLISHERS

STANFORD UNIVERSITY
LIBRARIES

THE

ARITHMETIC READER

FOR

THIRD GRADE PUPILS.

BY

FRANK H. HALL,

AUTHOR OF "HALL'S HELPS IN THE STUDY OF HISTORY, OR THE BACKBONE OF UNIVERSAL HISTORY," "ARITHMETIC OF THE FARM AND WORKSHOP," AND "ARITHMETIC READER FOR SECOND GRADE PUPILS."

CHICAGO:
SCOTT, FORESMAN AND CO.
1899.

613426

C
COPYRIGHT, 1894,
By GEORGE SHERWOOD & CO.
CHICAGO.

PRESS OF
THE HENRY O. SHEPARD CO.,
CHICAGO.

DEPARTMENT OF EDUCATION
[illegible]

SUGGESTIONS TO TEACHERS.

---

1. *The preparation necessary to the learner before beginning this book:*

(a) The pupil must be able to read without hesitation new matter of the grade usually found in the first half of a Third Reader.

(b) All the work that is found in the ARITHMETIC READER FOR SECOND GRADE PUPILS, must be mastered. Especially, should the pupil be familiar with the forty-five primary problems in addition, found on pages 23 and 65 of the Second Grade Book, and with the forty-seven primary problems in multiplication on pages 38, 69, and 95, and with the meaning of certain arithmetical expressions given on pages 41, 51, and 67.

2. *The preparation necessary to the learner before beginning any page of this book:*

(a) Before the pupil is allowed to attempt to read any one of the following pages the teacher should see that he is acquainted with every word, abbreviation, and sign, used thereon. The meaning of terms should be taught in this grade, not by defining them, but by using them. This is the natural method of learning new words. It is the method by which the pupil acquires a vocabulary of five hundred to seven hundred words before he enters the primary room. If the word *numerator* is to be taught, the pupil should first *see* a numerator—*see many numerators;* then be given the name; then hear and speak the word, and see its written form, until the symbol (the spoken or written word) instantly suggests that which is symbolized.

(b) By means of oral instruction and training, all the new number facts on a page should be taught *before the pupil attempts to read the page.* A MENTAL GYMNASTIC EXERCISE SUGGESTED BY THE PAGE ITSELF, SHOULD PRECEDE THE READING. If properly conducted, this will promote a mental vigor and acumen that will enable the pupil to see behind the words and signs on a page, that for which the symbols stand.

3. If the work in the Second Grade Book has been properly done, the pupil, before taking this book, has learned something of the five fundamental arithmetical processes. He can solve little problems in addition, subtraction, multiplication, and in each of the two cases of division. He is familiar with the terms add, subtract, product, quotient, difference, etc. He cannot define them, but he can use them, and can understand the meaning of these words when he hears them, or sees them on the blackboard or on the printed page. In order to apply the fundamental processes to fractions, he has nothing new to learn, except to become acquainted with the objects to be numbered; with halves, fourths, fifths, sixths, etc. His attention should not *at first* be called to the numerical symbols for the objects, as, ½, ¼, etc., but to the objects themselves, as, ⊖, ⊕, etc. If the pupil is familiar with that for which the word *fourth* stands, he will have no more difficulty in adding 1 fourth and 1 fourth than he has in adding 1 apple and 1 apple. Indeed, a large part of the work of teaching the application of the fundamental processes to fractions, is accomplished, when the pupil has become thoroughly familiar with the real fraction, and sees in every symbol fraction, as ¾, the real fraction for which it stands. The Pestalozzian principle, *the thing first, the name or the symbol afterwards*, must not be ignored in this work.

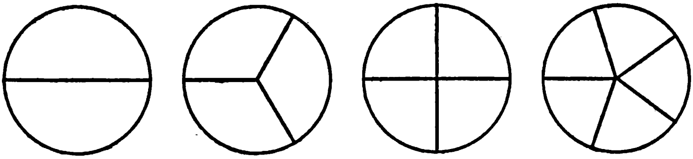
4. Nearly every lesson on the following pages has been tested in the school-room as thoroughly as it could be done with type-written matter, and the results, both in the mental training furnished and in the interest and enthusiasm manifested by the pupils in the vigorous exercise of their thought power, have been a revelation to the writer and to those associated with him.

It is believed that the teachers (representing more than twenty states and territories of the United States), who have found the Arithmetic Reader for Second Grade Pupils helpful to them in their efforts to "make thoughtful, intelligent readers" and to "develop independence and strength in solving number problems," will be willing to give the Third Grade Book a trial. When this shall have been done, the author will be grateful for such criticisms and suggestions as the results may warrant.

Waukegan, Ill., 1894. **F. H. H.**

THE ARITHMETIC READER.

TO THE TEACHER.—Draw upon the blackboard diagrams like those appearing below and teach the meaning of the expressions, one half, one third, one fourth, two thirds, two fourths, etc. Read "SUGGESTIONS TO TEACHERS," especially section 2, page 3.



1. One apple and one apple are —— apples.
2. One third and one third are —— thirds.

3. Three apples less one apple are —— apples.
4. Three fifths less one fifth are —— fifths.

5. Two fourths and two fourths are —— fourths.
6. Four fifths less one fifth are —— fifths.

7. John had one apple; he gave one fourth of it to Henry; he then had —— fourths of an apple.

8. Mrs. Brown gave one half of an apple to Mary and one half of an apple to Sarah; to both she gave —— ——.

9. Alfred had one half of an apple; William had one fourth of an apple; together they had —— fourths of an apple.

TO THE TEACHER.—Give many problems similar to those appearing below before the pupil attempts to read the page. Speak slowly and give time for thought. Use the diagrams. When the pupil takes the book, he should be able to read without hesitation.

1. Two halves are —— whole.
2. Two wholes are —— halves.

3. Three thirds are —— whole.
4. Two wholes are —— thirds.

5. Four fourths are —— whole.
6. Two wholes are —— fourths.

7. Five fifths are —— whole.
8. Two wholes are —— fifths.

9. Two times two apples are —— apples.
10. Two times two fourths are —— fourths.

11. One half of four apples is —— apples.
12. One half of four fifths is —— fifths.

13. Mary's mother gave one half of an apple to each of four children; to all she gave —— apples.

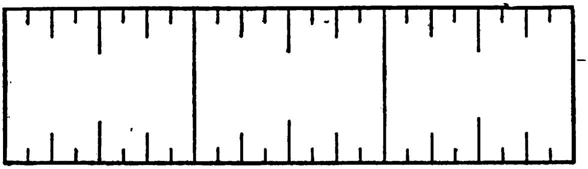
14. A good lady divided two pies equally among some hungry children, giving to each child one third of a pie; there were —— children.

15. Helen had a nice sweet orange; she gave two fifths of it to Sarah and two fifths to Jane; she then had —— ——.

16. At one half of a cent each, four apples cost —— cents.

17. If apples cost $\frac{1}{2}$ of a cent each, with three cents I can buy —— apples; with four cents I can buy —— apples.

TO THE TEACHER.—See suggestion on page 6; also read again section 2, (b), page 3. Require the pupil to draw a line one inch long and to divide it into halves, fourths, and eighths.



1. Three inches are —— half-inches.
2. Two inches are —— fourth-inches.
3. Four half-inches are —— inches.
4. One half of three inches is ————.
5. One inch is —— eighth-inches.
6. Two inches are —— eighth-inches.
7. One half-inch is —— eighth-inches.
8. One fourth-inch is —— eighth-inches.
9. One and one half inches are —— eighth-inches.

10. One half of an inch and one fourth of an inch are —— fourths of an inch.

11. One half of an inch and one eighth of an inch are —— eighths of an inch.

12. One half of an inch less one eighth of an inch are —— eighths of an inch.

13. Two times three eighths of an inch are —— eighths of an inch.

14. One half of four eighths of an inch is —— eighths of an inch.

15. One eighth of an inch is contained in a half inch —— times. One fourth of an inch is contained in a half inch —— times.

Teach the meaning of expressions denoting one or more of the equal parts of a unit from sixths to twelfths inclusive. Use diagrams similar to those on page 5.

1. Six marbles and 2 marbles are —— marbles.
2. Six twelfths and 2 twelfths are —— twelfths.

3. 6 marbles less 2 marbles are —— marbles.
4. 6 twelfths less 2 twelfths are —— twelfths.

5. Three times 2 marbles are —— marbles.
6. Three times 2 twelfths are —— twelfths.

7. 2 apples are contained in 8 apples —— ——.
8. 2 tenths are contained in 8 tenths —— ——.

9. One half of 8 apples is —— apples.
10. One half of 8 tenths is —— tenths.

11. Mary earned 2 tenths of a dollar Thursday and 3 tenths of a dollar Friday; in both days she earned —— tenths of a dollar.

12. Reuben had 6 tenths of a dollar; he spent 4 tenths of a dollar; he then had —— tenths of a dollar.

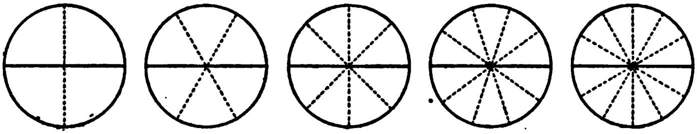
13. John had 2 tenths of a dollar; Henry had three times as much money as John; Henry had —— tenths of a dollar.

14. James had 3 oranges which he divided among the boys in his class, giving to each boy one third of an orange; there were —— boys in the class.

15. Edwin had 3 apples which he divided equally between 2 boys; each boy received —— and —— —— apples.

16. The baker had 2 pies exactly alike; Ned bought 1 third of one of them, and Peter bought 1 fourth of the other. Who bought the larger piece?

Use diagrams like those appearing below and lead the pupil to perceive that one half can be expressed in fourths, sixths, eighths, etc. Give many problems similar to those on this page before the reading of the page is attempted by the pupil.



1. One half is —— fourths.
2. One half is —— eighths.
3. One half is —— sixths.
4. One half is —— twelfths.
5. One half is —— tenths.
6. One half and one fourth are —— fourths.
7. One half and one sixth are —— sixths.
8. One half and one tenth are —— tenths.
9. One half and one eighth are —— eighths.
10. One half and one twelfth are —— twelfths.

11. One half less one sixth are —— sixths.
12. One half less one tenth are —— tenths.
13. One half less one eighth are —— eighths.
14. One half less one twelfth are —— twelfths.

15. One half and two tenths are —— tenths.
16. One half less two tenths are —— tenths.
17. One half and two twelfths are —— twelfths.
18. One half less two twelfths are —— twelfths.

19. 2 fourths are —— half. 3 sixths are —— ——.
20. 6 fourths are one and —— ——.
21. 8 fourths are ——. 6 thirds are ——.
22. 10 fourths are two and —— ——.

Read "SUGGESTIONS TO TEACHERS" on pages 3 and 4, and note especially directions given in Section 2. Explain to the pupil that the expression one and one half means one whole and one half of another whole.

1. One and one half are —— halves.
2. Five halves are two and —— half.
3. Three and one half are —— halves.
4. Three halves are —— and —— half.
5. Two and one half are —— halves.

6. One and one half inches and one and one half inches are —— inches.

7. Two inches less one half of an inch are —— and —— —— inches.

8. Two times one and one half inches are —— inches.

9. One half of an inch is contained in one and one half inches —— times.

10. One half of one half of an inch is —— —— of an inch.

11. Jane had 1 half of a dollar; she earned 1 tenth of a dollar; she then had ————————.

12. Mary had 1 half of a dollar; she spent 1 tenth of a dollar; she then had ————————.

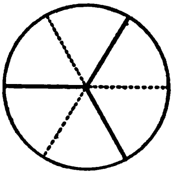
13. John had 1 and 1 half dollars; Reuben had two times as much; Reuben had ————————.

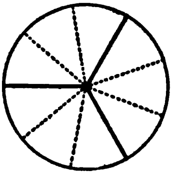
14. Henry divided 1 and 1 half dollars equally among some children, giving to each child 1 half of a dollar. There were —— children.

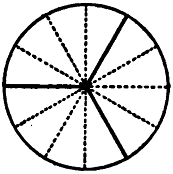
15. James had 2 and 1 half dollars; he spent one half of his money; he then had ————————

16. One half of a dollar is how many times one fourth of a dollar?

Lead the pupil to perceive that thirds can be expressed in sixths, ninths, twelfths, etc. Use diagrams carefully drawn upon the blackboard and teach the number facts given below *before the pupil attempts to read this page.*







1. One third is —— sixths.
2. One third is —— twelfths.
3. One third is —— ninths.
4. Two thirds are —— sixths.
5. Two thirds are —— twelfths.
6. Two thirds are —— ninths.
7. One third and one sixth are —— sixths.
8. One third and one twelfth are —— twelfths.
9. One third and one ninth are —— ninths.
10. One third less one twelfth are —— twelfths.
11. One third less one ninth are —— ninths.

12. Two thirds and 1 sixth are —— sixths.
13. Two thirds and 1 twelfth are —— twelfths.
14. Two thirds and 1 ninth are —— ninth.
15. Two thirds less 1 sixth are —— sixths.
16. Two thirds less 1 twelfth are —— twelfths.
17. Two thirds less 1 ninth are —— ninths.

18. One third and 2 ninths are —— ninths.
19. Two thirds and 2 ninths are —— ninths.
20. Two thirds less 2 ninths are —— ninths.
21. Two thirds less 2 twelfths are —— twelfths.
22. Two thirds and 2 twelfths are —— twelfths.

See suggestion on page 6.

1. Two sixths are —— third.
2. Four sixths are —— thirds.
3. Six ninths are —— thirds.
5. One and one third are —— thirds.
6. Five thirds are one and —— thirds.

7. One and one third pies and one and one third pies are ———————— pies.

8. Two pies less one third of a pie are ————————.

9. Two times two and one third pies are ————————.

10. One third of a pie is contained in one and one third pies —— times.

11. One half of one third of a pie is —— —— of a pie.

12. Sarah had one third of a pie; Alice had one sixth of a pie; together they had ————————.

13. Peter had one third of a pie; he ate one sixth of a pie; he then had ————————.

14. In Mrs. Smith's basket there were two and one third pies; in Mrs. Jones's basket there were two times as many. Mrs. Jones had ————————.

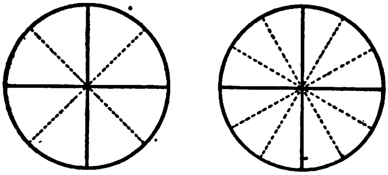
15. Mrs. Smith divided one and one third pies among her children, giving to each, one third of a pie. She had —— children.

16. Mrs. Jones divided one half of a pie equally among three children; each child received —— —— of a pie.

17. Two thirds of a pie less one sixth of a pie are —— —— of a pie.

18. Two thirds and two sixths are ————————.

Lead the pupil to perceive that fourths can be expressed in eighths, twelfths, etc. See suggestions on page 11.



1. One fourth is —— eighths.
2. Three fourths are —— eighths.
3. Two fourths are —— eighths.
4. Four eighths are —— half.
5. One fourth is —— twelfths.
6. Three fourths are —— twelfths.
7. Two fourths are —— twelfths.
8. Six twelfths are —— half.
9. One fourth and 1 eighth are —— eighths.
10. One fourth and 1 twelfth are —— twelfths.
11. One fourth less 1 twelfth are —— twelfths.
12. One fourth and 2 twelfths are —— twelfths.

13. Three fourths and 1 eighth are —— eighths.
14. Three fourths and 1 twelfth are —— twelfths.
15. Three fourths less 1 eighth are —— eighths.
16. Three fourths less 1 twelfth are —— twelfths.

17. Five eighths and 1 fourth are —— eighths.
18. Five eighths less 1 fourth are —— eighths.
19. Three eighths and 1 fourth are —— eighths.

20. Five twelfths and 1 fourth are —— twelfths.
21. Five twelfths less 1 fourth are —— twelfths.
22. Seven twelfths and 1 fourth are —— twelfths.
23. Seven twelfths less 1 fourth are —— twelfths.

See that the pupil is familiar with that for which the word peck stands. See suggestions on page 6.

1. Two eighths are —— fourth.
2. Six eighths are —— fourths.
3. Three twelfths are —— fourth.
4. One and one fourth are —— fourths.
5. Seven fourths are —— and —— fourths.

6. One and one fourth pecks and one and three fourths pecks are —— pecks.

7. Five eighths of a peck less one fourth of a peck are —— —— of a peck.

8. Three times one and one fourth pecks are —— and —— —— pecks.

9. One fourth of a peck is contained in one and one half pecks —— times.

10. One half of one fourth of a peck is —— —— of a peck.

11. William gave one half of a peck of oats to the old horse and 1 eighth of a peck to the pony; to both he gave —— —— of a peck.

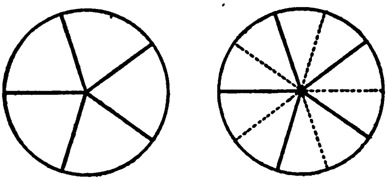
12. Edwin had one half of a peck of nuts; he gave 1 eighth of a peck to Mary; he then had —— —— of a peck.

13. Arthur gave 3 fourths of a peck of apples to each of 3 boys; to all he gave ————————.

14. Harry divided 1 and 1 fourth pecks of bran among his ponies, giving to each 1 eighth of a peck. He had —— ponies.

15. Mr. Price divided 1 fourth of a peck of corn equally among 3 sheep; each sheep received ————.

Lead the pupil to perceive that fifths can be expressed in tenths. See suggestion on page 11.



1. One fifth is ——— tenths.
2. Two fifths are ——— tenths.
3. Four fifths are ——— tenths.
4. Three fifths are ——— tenths.
5. One fifth and 1 tenth are ——— tenths.
6. Two fifths and 1 tenth are ——— tenths.
7. Four fifths and 1 tenth are ——— tenths.
8. Three fifths and 1 tenth are ——— tenths.

9. Three tenths and 1 fifth are ——— tenths.
10. Five tenths and 1 fifth are ——— tenths.
11. Seven tenths and 1 fifth are ——— tenths.
12. Nine tenths and 1 fifth are —————.

13. Two fifths less 1 tenth are ——— tenths.
14. Three fifths less 1 tenth are ——— tenths.
15. Four fifths less 1 tenth are ——— tenths.
16. Five fifths less 1 tenth are ——— tenths.

17. Five tenths less 1 fifth are ——— tenths.
18. Seven tenths less 1 fifth are ——— tenths.
19. Nine tenths less 1 fifth are ——— tenths.
20. Nine tenths less 2 fifths are ——— tenths.

21. Three fifths and 3 tenths are ——— tenths.
22. Three fifths less 3 tenths are ——— tenths.

Make the pupil familiar with that for which the word mile stands. See suggestions on page 6.

1. Four tenths are —— fifths.
2. Six tenths are —— fifths.
3. Two tenths are —— fifth.
4. Eight tenths are —— fifths.
5. One and one fifth are —— fifths.
6. Nine fifths are —— and —— fifths.

7. Two and 1 fifth miles and 2 and 1 tenth miles are —— and —— tenths miles.

8. Three miles less 2 fifths of a mile are —— and —— fifths miles.

9. Four times 1 and 1 tenth miles are —— and —— miles.

10. One tenth of a mile is contained in 3 fifths of a mile —— times.

11. One half of 1 fifth of a mile is ————.

12. Emma lives 1 tenth of a mile west of the post-office; Sarah lives 1 fifth of a mile east of the post-office; from Emma's home to Sarah's home it is ————.

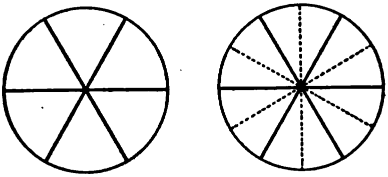
13. Fred lives 2 miles from the school-house; last night on his way home he rode 1 and 3 fifths miles and walked the remainder of the distance; he walked ————.

14. William walked 3 fifths of a mile; James walked twice as far; James walked ————.

15. Alice walked 1 fifth of a mile; Mary walked 1 and 1 fifth miles; Mary walked —— times as far as Alice.

16. One half of 6 tenths of a mile is —— —— of a mile. One half of 4 fifths of a mile is —— —— of a mile.

Lead the pupil to perceive that sixths can be expressed in twelfths. See suggestion on page 11.



1. One sixth is —— twelfths.
2. Three sixths are —— twelfths.
3. Two sixths are —— twelfths.
4. Five sixths are —— twelfths.
5. Four sixths are —— twelfths.
6. 1 sixth and 1 twelfth are —— twelfths.
7. 2 sixths and 1 twelfth are —— twelfths.
8. 4 sixths and 1 twelfth are —— twelfths.
9. 3 sixths and 1 twelfth are —— twelfths.
10. 5 sixths and 1 twelfth are —— twelfths.

11. 2 sixths less 1 twelfth are —— twelfths.
12. 4 sixths less 1 twelfth are —— twelfths.
13. 3 sixths less 1 twelfth are —— twelfths.
14. 5 sixths less 1 twelfth are —— twelfths.
15. 6 sixths less 1 twelfth are —— twelfths.

16. 5 twelfths and 1 sixth are —— twelfths.
17. 5 twelfths less 1 sixth are —— twelfths.
18. 7 twelfths less 1 sixth are —— twelfths.
19. 7 twelfths and 1 sixth are —— twelfths.

20. 2 sixths and 2 twelfths are —— twelfths.
21. 2 sixths less 2 twelfths are —— twelfths.
22. 3 sixths and 3 twelfths are —— twelfths.

Require the pupil to draw upon the blackboard a line one foot long; $\frac{1}{2}$ of a foot; $\frac{1}{12}$ of a foot; $\frac{1}{6}$ of a foot, etc. Read again SUGGESTIONS TO TEACHERS on pages 3 and 4, and note especially Section 2.

1. Two twelfths are —— sixth.
2. Ten twelfths are —— sixths.
3. Four twelfths are —— ——.
4. Six twelfths are —— ——.
5. Eight twelfths are —— ——.
6. Two and 1 sixth feet and 2 and 1 twelfth feet are —— and —— —— feet.
7. Three feet less 1 twelfth of a foot are —— and —— —— feet.
8. Five times 2 and 1 twelfth feet are —— and —— —— feet.
9. One sixth of a foot is contained in 1 and 1 half feet —— times.
10. One half of 1 sixth of a foot is ————.

11. Eddie has a string 2 and 1 half feet long; Joseph has a string 2 and 1 twelfth feet long; together the strings are ————.
12. Howard had a stick of candy 2 feet long; he broke off 11 twelfths of a foot and gave it to his sister; he then had a stick of candy ———————— long.
13. I have a pane of glass that is 1 and 5 twelfths feet wide; it is twice as long as it is wide; it is —— and —— —— feet long.
14. A stick of molasses candy 2 and 1 half feet long was cut into pieces 1 sixth of a foot long; there were —— pieces.
15. Mary has a piece of ribbon 2 and 1 half feet long; Ellen has a piece 1 half as long; Ellen's ribbon is ———————— long.

Lead the pupil to perceive that $\frac{1}{2}$ and $\frac{1}{3}$ can each be changed to sixths; $\frac{1}{3}$ and $\frac{1}{4}$ to twelfths, etc. See that the pupil is familiar with the expression, *find the sum of*, and with the abbreviation, *etc.*

1. I can change one half to fourths, sixths, eighths, ———, ———, etc.

2. I can change thirds to sixths, ———, ———, etc.

3. I can change fourths to eighths, ———, etc.

4. I can change fifths to ———, ———, etc.

5. I can change sixths to ———, ———, etc.

6. I can change halves and thirds to sixths.

   One half is ——— sixths.
   One third is ——— sixths.

7. I can change halves and fifths to ———.

   One half is ——— tenths.
   One fifth is ——— tenths.

8. I can change thirds and fourths to ———.

   One third is ——— twelfths.
   One fourth is ——— twelfths.

9. Find the sum of one half and one sixth.

   I can change halves to sixths.
   One half is ——— sixths.
   ——— sixths and ——— sixth are ——— sixths.
   The sum of 1 half and 1 sixth is ——— ———.

10. Find the sum of one half and one third.

    I can change halves and thirds to sixths.
    One half is ——— sixths.
    One third is ——— sixths.
    ——— sixths and ——— sixths are ——— sixths.
    The sum of 1 half and 1 third is ——— ———.

11. Sarah had one half of a yard of muslin; Jane had one third of a yard; together they had ——— ——— of a yard.

1. Find the sum of one half and one fourth.

I can change halves to fourths.

One half is —— fourths.

—— fourths and —— fourth are —— fourths.

The sum of 1 half and 1 fourth is —— ——.

2. Find the sum of one third and one fourth.

I can change thirds and fourths to ——.

One third is —— twelfths.

One fourth is —— twelfths.

—— twelfths and —— twelfths are —— twelfths.

The sum of 1 third and 1 fourth is —— ——.

3. Find the sum of one half and one fifth.

I can change halves and fifths to ——.

One half is —— tenths.

One fifth is —— tenths.

—— tenths and —— tenths are —— tenths.

The sum of 1 half and 1 fifth is —— ——.

4. Henry lives one half of a mile east of the school-house and Samuel lives one fifth of a mile west of the school-house. How far is it from Henry's home to Samuel's home?

I can change halves and fifths to ——.

One half is —— tenths.

One fifth is —— tenths.

—— tenths and —— tenths are —— tenths.

From Henry's home to Samuel's home, it is —— —— of a mile.

5. Find the sum of 1 half and 2 fifths.

I can change ——————.*

---

* Complete the solution of the problem.

Make the pupil familiar with the expression, find the difference of.

1. Find the difference of 1 half and 1 sixth.
I can change halves to ——.
One half is —— sixths.
—— sixths less ——sixth are —— sixths.
The difference of 1 half and 1 sixth is —— ——.

2. Find the difference of 1 half and 1 third.
I can change halves and thirds to ——.
One half is —— sixths.
One third is —— sixths.
—— sixths less —— sixths is —— sixth.
The difference of 1 half and 1 third is —— ——.

3. Find the difference of 1 half and 1 fourth.
I can change halves to ——.
One half is —— fourths.
—— fourths less —— fourth is —— fourth.
The difference of 1 half and 1 fourth is —— ——.

4. Find the difference of 1 third and 1 fourth.
I can change thirds and fourths to ——.
One third is —— twelfths.
One fourth is —— twelfths.
—— twelfths less ——twelfths is—— twelfth.
The difference of 1 third and 1 fourth is —— ——.

5. Find the difference of 1 half and 1 fifth.
I can change halves and fifths to ——.
One half is —— tenths.
One fifth is —— tenths.
—— tenths less —— tenths are —— tenths.
The difference of 1 half and 1 fifth is —— ——.

The problems on this page should be solved by the pupil, ***first silently***, then with oral expression, using language similar to that found on the preceding pages.

1. Find the sum of 1 half and 1 eighth.
   I can change halves to ——————— *
2. Find the difference of 1 half and 1 eighth.
   I can change ——————————— *

3. Find the sum of 1 half and 1 tenth.
   I can change halves to ——————— *
4. Find the difference of 1 half and 1 tenth.
   I can change ——————————— *

5. Find the sum of 1 half and 1 twelfth.
   I can change halves to ——————— *
6. Find the difference of 1 half and 1 twelfth.
   I can change ——————————— *

7. Find the sum of 1 third and 1 sixth.
   I can change thirds to ——————— *
8. Find the difference of 1 third and 1 sixth.
   I can change ——————————— *

9. Find the sum of 1 third and 1 ninth.
   I can change thirds to ——————————— *
10. Find the difference of 1 third and 1 ninth.
    I can change ——————————————— *

11. Find the sum of 1 third and 1 twelfth.
    I can change thirds to ——————————— *
12. Find the difference of 1 third and 1 twelfth.
    I can change ——————————————— *
13. Find the sum of 1 third and 2 twelfths.
    I can change ——————————— *

*Complete the solution of the problem.

See suggestion on page 22. If necessary, teach the meaning and use of the terms add and subtract.

1. Add 1 fourth and 1 eighth.
I can change fourths to ____________________ *
2. From 1 fourth subtract 1 eighth.
I can change ______________________________ *

3. Add 1 fourth and 1 twelfth.
I can change fourths to ____________________ *
4. From 1 fourth subtract 1 twelfth.
I can change ______________________________ *

5. Add 1 fifth and 1 tenth.
I can change fifths to ____________________ *
6. From 1 fifth subtract 1 tenth.
I can change ______________________________ *

7. Add 1 sixth and 1 twelfth.
I can change sixths to ____________________ *
8. From 1 sixth subtract 1 twelfth.
I can change ______________________________ *

9. Add 2 thirds and 1 sixth.
I can change thirds to ____________________ *
10. From 2 thirds subtract 1 sixth.
I can change ______________________________ *

11. Add 2 thirds and 1 ninth.
I can change thirds to ____________________ *
12. From 2 thirds subtract 1 ninth.
I can change ______________________________ *
13. Add 2 thirds and 2 ninths.
I can change ______________________________ *

***Complete the solution of the problem.**

See suggestion on page 22. If the pupil is unable to do the work found on this page, review pp. 19, 20, and 21.

1. Add 1 half and 1 third.
I can change halves and thirds to ——————— *
2. From 1 half subtract 1 third.
I can change ——————————————— *

3. Add 1 half and 1 fifth.
I can change halves and fifths to——————— *
4. From 1 half subtract 1 fifth.
I can change ——————————————— *

5. Add 1 half and 2 fifths.
I can change halves and fifths to ——————— *
6. From 1 half subtract 2 fifths.
I can change ——————————————— *

7. Add 3 fifths and 1 half.
I can change fifths and halves to ——————— *
8. From 3 fifths subtract 1 half.
I can change ——————————————— *

9. Add 1 third and 1 fourth.
I can change thirds and fourths to ——————— *
10. From 1 third subtract 1 fourth.
I can change ——————————————— *

11. Add 2 thirds and 1 half.
I can change thirds and halves to ——————— *
12. From 2 thirds subtract 1 half.
I can change ——————————————— *
13. Add 2 thirds and 1 fourth.

*** Complete the solution of the problem.**

Pupils usually become somewhat familiar with numerical expressions representing parts of units, while in the first and second grades, but, for obvious reasons, it is better to express at least the denominators of fractions *by words* in the early part of the third grade work. Figures are here introduced, but great care must be taken that the minds of pupils *do not stop on the symbol.* They must think *that for which the symbol stands.* The expression $\frac{3}{4}$ must suggest, not *one* object but three of those parts of a unit called fourths, or 3 fourths.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{2}{5}$ $\frac{5}{6}$ + − ×

1. $\frac{1}{2} + \frac{1}{4}$ **(To be read, $\frac{1}{2}$ plus $\frac{1}{4}$.)**

(a) $\frac{1}{2} + \frac{1}{4}$, means, $\frac{1}{2}$ *and* $\frac{1}{4}$.

(b) $\frac{1}{2}$ and $\frac{1}{4}$ are —— ——.

(c) Arthur had $\frac{1}{2}$ of a dollar; he earned $\frac{1}{4}$ of a dollar; he then had —— ——.

2. $\frac{1}{2} - \frac{1}{4}$ **(To be read, $\frac{1}{2}$ minus $\frac{1}{4}$.)**

(a) $\frac{1}{2} - \frac{1}{4}$, means, $\frac{1}{2}$ *less* $\frac{1}{4}$.

(b) $\frac{1}{2}$ less $\frac{1}{4}$ is —— ——.

(c) Mary had $\frac{1}{2}$ of a dollar; she spent $\frac{1}{4}$ of a dollar; she then had —— —— of a dollar.

3. $\frac{2}{5} \times 3$ **(To be read, $\frac{2}{5}$ multiplied by 3.)**

(a) $\frac{2}{5} \times 3$, means, *3 times* $\frac{2}{5}$.

(b) 3 times $\frac{2}{5}$ are —— —— or 1 and —— ——.

(c) Henry bought 3 books; they cost $\frac{2}{5}$ of a dollar each; all the books cost ————————.

Using the above as models, require each pupil (a) to tell the meaning of one of the following expressions; (b) to complete the statement; (c) to tell the suggested number story. This work should be done, sometimes orally, sometimes with pencil. Review the page many times and require similar work with other fractions and other number stories.

$\frac{1}{2} + \frac{1}{5}$ $\frac{1}{2} - \frac{1}{5}$ $\frac{2}{5} \times 2$

If necessary, teach the meaning and use of the terms multiply and product.

1. Find the sum of $\frac{1}{2}$ and $\frac{1}{6}$. I can change ——— *
2. Find the difference of $\frac{1}{2}$ and $\frac{1}{6}$. I can ——— *
3. Find the product of $\frac{1}{2}$ and 4. 4 times ——— *

4. Find the sum of $\frac{1}{2}$ and $\frac{1}{8}$. I can change ——— *
5. Find the difference of $\frac{1}{2}$ and $\frac{1}{8}$. I can ——— *
6. Find the product of $\frac{2}{5}$ and 3. 3 times ——— *

7. Find the sum of $\frac{1}{2}$ and $\frac{1}{10}$. I can change ——— *
8. Find the difference of $\frac{1}{2}$ and $\frac{1}{10}$. I can ——— *
9. Find the product of $\frac{2}{5} \times 4$. 4 times ——— *

10. Add $\frac{1}{2}$ and $\frac{1}{12}$. $\frac{1}{2} + \frac{1}{12} =$ $\frac{1}{2} + \frac{2}{12} =$
11. From $\frac{1}{2}$ subtract $\frac{1}{12}$. $\frac{1}{2} - \frac{1}{12} =$
12. Multiply $\frac{1}{5}$ by 4. $\frac{1}{5} \times 4 =$ $\frac{1}{5} \times 6 =$

13. Add $\frac{1}{3}$ and $\frac{1}{9}$. $\frac{1}{3} + \frac{1}{9} =$ $\frac{1}{3} + \frac{2}{9} =$
14. From $\frac{1}{3}$ subtract $\frac{1}{9}$. $\frac{1}{3} - \frac{1}{9} =$
15. Multiply $\frac{1}{3}$ by 4. $\frac{1}{3} \times 4 =$ $\frac{1}{3} \times 5 =$

16. Add $\frac{1}{4}$ and $\frac{1}{8}$. $\frac{1}{4} + \frac{1}{8} =$ $\frac{1}{4} + \frac{2}{8} =$
17. From $\frac{1}{4}$ subtract $\frac{1}{8}$. $\frac{1}{4} - \frac{1}{8} =$
18. Multiply $\frac{1}{4}$ by 5. $\frac{1}{4} \times 5 =$ $\frac{1}{4} \times 7 =$
19. Multiply $1\frac{1}{4}$ by 3. $1\frac{1}{4} \times 3 =$ $1\frac{1}{2} \times 2 =$

REVIEW.

(Do not omit.)

(a) Tell the meaning of the expression. (b) Complete the statement. (c) Tell the suggested number story.

$\frac{1}{2} + \frac{1}{10}$ $\frac{1}{2} - \frac{1}{10}$ $\frac{2}{10} \times 4$

*** Complete the solution of the problem.**

Review page 67 of ARITHMETIC READER FOR SECOND GRADE PUPILS.

2 dollars ÷ $\frac{1}{2}$ a dollar.

(a) 2 dollars ÷ $\frac{1}{2}$ a dollar, means, *find how many times $\frac{1}{2}$ a dollar is contained in 2 dollars.*

(b) $\frac{1}{2}$ a dollar is contained in 2 dollars ——— ———.

(c) Joseph had 2 dollars with which to buy tickets to the World's Fair at $\frac{1}{2}$ a dollar each; he could buy ——— tickets.

$\frac{1}{2}$ a dollar ÷ 2.

(a) $\frac{1}{2}$ a dollar ÷ 2, means, *find 1 half of $\frac{1}{2}$ of a dollar.*

(b) $\frac{1}{2}$ of $\frac{1}{2}$ of a dollar is ———————.

(c) John paid $\frac{1}{2}$ of a dollar for 2 pounds of coffee; each pound cost ——— ——— a dollar.

Using the foregoing as models, (a) tell the meaning of the following expressions, (b) complete the statements, and (c) tell the suggested number stories.

2 dollars ÷ $\frac{1}{4}$ of a dollar.
$\frac{1}{4}$ of a dollar ÷ 2.

1. 4 pecks ÷ $\frac{1}{2}$ a peck, means, ———————.
2. $\frac{1}{2}$ a peck ÷ 4, means, ———————.

3. 2 inches ÷ $\frac{1}{2}$ an inch, means, ———————.
4. $\frac{1}{2}$ an inch ÷ 2, means, ———————.

5. 2 oranges ÷ $\frac{1}{2}$ an orange, means, ———————.
6. $\frac{1}{2}$ an orange ÷ 2, means, ———————.

7. 3 dollars ÷ $\frac{1}{4}$ of a dollar, means, ———————.
8. $\frac{1}{4}$ of a dollar ÷ 3, means, ———————.

9. 2 apples ÷ $\frac{1}{3}$ of an apple, means, ———————.
10. $\frac{1}{3}$ of an apple ÷ 2, means, ———————.

Teach the pupil that when the sign of division is followed by a fraction it (usually) indicates that "case" of division in which the problem is, *to find how many times one number is contained in another;* but when the sign of division is followed by an integer (abstract) it may indicate that "case" in division sometimes called *partition.* Thus, 4 ÷ ⅓, means, *find how many times ⅓ is contained in 4;* but ⅓ ÷ 4, means, *find ¼ of ⅓.*

1. $\frac{3}{8} + \frac{1}{4}$, means, ____________. $\frac{3}{8}$ and $\frac{1}{4}$ =
2. $\frac{3}{8} - \frac{1}{4}$, means, ____________. $\frac{3}{8}$ less $\frac{1}{4}$ =
3. $\frac{3}{8} \times 4$, means, ____________. 4 times $\frac{3}{8}$ =
4. $4 \div \frac{1}{3}$, means, ____________. $\frac{1}{3}$ is con————
5. $\frac{1}{3} \div 2$, means, ____________. $\frac{1}{2}$ of $\frac{1}{3}$ =

6. $\frac{5}{8} + \frac{1}{2}$, means, ____________. $\frac{5}{8}$ and $\frac{1}{2}$ =
7. $\frac{5}{8} - \frac{1}{2}$, means, ____________. $\frac{5}{8}$ less $\frac{1}{2}$ =
8. $\frac{5}{8} \times 2$, means, ____________. 2 times $\frac{5}{8}$ =
9. $\frac{5}{8} \div \frac{1}{8}$, means, ____________. $\frac{1}{8}$ is con————
10. $\frac{1}{2} \div 3$, means, ____________. $\frac{1}{3}$ of $\frac{1}{2}$ =

11. $\frac{5}{6} + \frac{1}{2}$, means, ____________. $\frac{5}{6} + \frac{1}{2} =$
12. $\frac{5}{6} - \frac{1}{2}$, means, ____________. $\frac{5}{6} - \frac{1}{2} =$
13. $\frac{5}{6} \times 2$, means, ____________. $\frac{5}{6} \times 2 =$
14. $\frac{5}{6} \div \frac{1}{6}$, means, ____________. $\frac{5}{6} \div \frac{1}{6} =$
15. $\frac{1}{5} \div 2$, means, ____________. $\frac{1}{5} \div 2 =$

16. $\frac{7}{10} + \frac{1}{2}$, means, ____________. $\frac{7}{10} + \frac{1}{2} =$
17. $\frac{7}{10} - \frac{1}{2}$, means, ____________. $\frac{7}{10} - \frac{1}{2} =$
18. $\frac{7}{10} \times 2$, means, ____________. $\frac{7}{10} \times 2 =$
19. $\frac{6}{10} \div \frac{2}{10}$, means, ____________. $\frac{6}{10} \div \frac{2}{10} =$
20. $\frac{1}{4} \div 3$, means, ____________. $\frac{1}{4} \div 3 =$

21. $\frac{8}{10} \div \frac{4}{10}$, means, ____________. $\frac{8}{10} \div \frac{4}{10} =$
22. $\frac{1}{2} \div 4$, means, ____________. $\frac{1}{2} \div 4 =$

23. $\frac{9}{12} \div \frac{3}{12}$, means, ____________. $\frac{9}{12} \div \frac{3}{12} =$
24. $\frac{1}{2} \div 5$, means, ____________. $\frac{1}{2} \div 5 =$
25. $\frac{1}{2} \div 6$, means, ____________. $\frac{1}{2} \div 6 =$

Draw two lines on the blackboard, each one foot long. Divide one of them into halves, fourths, and twelfths; the other into thirds, sixths, and twelfths.

1. One half of a foot is —— inches.
2. Two fourths of a foot are —— inches.
3. Six twelfths of a foot are —— inches.

4. One third of a foot is —— inches.
5. Two sixths of a foot are —— inches.

Do not begin the following drill until the pupil has a clear perception of the facts to be stated. Then it should be read, *first by line*, afterwards by column, until every pupil can read any one of the four columns in the exercise *in twenty seconds or less*.

FOR DRILL.

$\frac{1}{2} = \frac{}{4}$	$\frac{1}{2} = \frac{}{6}$	$\frac{1}{2} = \frac{}{8}$	$\frac{1}{2} = \frac{}{10}$
$\frac{1}{2} = \frac{}{12}$	$\frac{1}{3} = \frac{}{6}$	$\frac{2}{3} = \frac{}{6}$	$\frac{1}{3} = \frac{}{9}$
$\frac{2}{3} = \frac{}{9}$	$\frac{1}{3} = \frac{}{12}$	$\frac{2}{3} = \frac{}{12}$	$\frac{3}{3} =$
$\frac{1}{4} = \frac{}{8}$	$\frac{2}{4} = \frac{}{8}$	$\frac{3}{4} = \frac{}{8}$	$\frac{1}{4} = \frac{}{12}$
$\frac{2}{4} = \frac{}{12}$	$\frac{3}{4} = \frac{}{12}$	$\frac{1}{5} = \frac{}{10}$	$\frac{2}{5} = \frac{}{10}$
$\frac{3}{5} = \frac{}{10}$	$\frac{4}{5} = \frac{}{10}$	$\frac{1}{6} = \frac{}{12}$	$\frac{2}{6} = \frac{}{12}$
$\frac{3}{6} = \frac{}{12}$	$\frac{4}{6} = \frac{}{12}$	$\frac{5}{6} = \frac{}{12}$	$\frac{6}{6} =$

SLATE WORK.

Model.

$$\begin{array}{l} \frac{2}{3} + \frac{1}{2} \\ \hline \frac{2}{3} = \frac{4}{6} \\ \frac{1}{2} = \frac{3}{6} \\ \hline \frac{7}{6} = 1\frac{1}{6} \end{array}$$

Model.

$$\begin{array}{l} \frac{3}{4} - \frac{2}{3} \\ \hline \frac{3}{4} = \frac{9}{12} \\ \frac{2}{3} = \frac{8}{12} \\ \hline \frac{1}{12} \end{array}$$

Model.

$$\begin{array}{l} \frac{2}{3} \times 5 \\ \hline \frac{2}{3} \\ 5 \\ \hline \frac{10}{3} = 3\frac{1}{3} \end{array}$$

In the manner shown in the models, require the pupil to solve the following upon slate or paper.

$\frac{2}{3} + \frac{1}{4}$ $\frac{2}{3} - \frac{1}{4}$ $\frac{3}{4} \times 3$

$\frac{3}{5} + \frac{1}{2}$ $\frac{2}{3} - \frac{1}{2}$ $\frac{3}{7} \times 3$

See that the pupil is familiar with that for which the word yard stands.

1. The sum of $2\frac{1}{6}$ yards and $2\frac{1}{3}$ yards is —— and —— —— yards.

2. The difference of $3\frac{5}{6}$ yards and $2\frac{1}{2}$ yards is —— and —— —— yards.

3. The product of $2\frac{1}{5}$ yards and 3 is —— and —— —— yards.

4. The quotient of $2\frac{1}{3}$ yards divided by $\frac{1}{3}$ of a yard is ——.

5. The quotient of $\frac{1}{3}$ of a yard divided by 2 is —— —— of a yard.

6. Jane had $\frac{3}{4}$ of a yard of ribbon; Mary had $\frac{1}{8}$ of a yard; together they had —— —— of a yard.

7. Emma had $\frac{2}{3}$ of a yard of ribbon; she gave $\frac{1}{6}$ of a yard to her sister; Emma then had —— —— of a yard.

8. Sarah had three pieces of ribbon, each of which was $\frac{1}{2}$ of a yard long; Helen had as much ribbon as Sarah, but it was all in one piece; Helen's piece of ribbon was —— and —— —— yards long.

9. Miss Williams divided 2 yards of ribbon among her pupils, giving to each $\frac{1}{4}$ of a yard; she had —— pupils.

10. Miss Page divided $\frac{1}{2}$ of a yard of ribbon equally among 3 children; each child received —— —— of a yard. One half of a yard is —— inches. One sixth of a yard is —— inches.

SLATE WORK.

(See models on page 29.)

$\frac{1}{5} + \frac{1}{2}$ $\quad$ $\frac{4}{5} - \frac{1}{2}$ $\quad$ $\frac{3}{5} \times 4$

$\frac{3}{4} + \frac{1}{3}$ $\quad$ $\frac{1}{2} - \frac{1}{3}$ $\quad$ $\frac{4}{7} \times 2$

Make the pupil familiar with the expression, **find the quotient of.** If pupils hesitate at the work in division, give more oral drill and review page 28. Ask *again and again* the meaning of such expressions as $2 \div \frac{1}{4}$; $\frac{1}{4} \div 2$; $\frac{1}{4} \times 2$. *Such problems will be easily solved if the pupil knows what they mean.*

1. Add $\frac{5}{8}$ and $\frac{1}{2}$. $\frac{5}{8} + \frac{1}{2} =$
2. From $\frac{5}{8}$ subtract $\frac{1}{2}$. $\frac{5}{8} - \frac{1}{2} =$
3. Multiply $\frac{5}{8}$ by 2. $\frac{5}{8} \times 2 =$
4. Divide $\frac{3}{8}$ by $\frac{1}{8}$. $\frac{3}{8} \div \frac{1}{8} =$
5. Divide $\frac{1}{4}$ by 2. $\frac{1}{4} \div 2 =$

6. Add $\frac{7}{10}$ and $\frac{1}{2}$. $\frac{7}{10} + \frac{1}{2} =$
7. From $\frac{7}{10}$ subtract $\frac{1}{2}$. $\frac{7}{10} - \frac{1}{2} =$
8. Multiply $\frac{3}{10}$ by 4. $\frac{3}{10} \times 4 =$
9. Divide $\frac{8}{10}$ by $\frac{2}{10}$. $\frac{8}{10} \div \frac{2}{10} =$
10. Divide $\frac{1}{3}$ by 3. $\frac{1}{3} \div 3 =$

11. Find the sum of $\frac{7}{12}$ and $\frac{1}{2}$. I can change ——
12. Find the difference of $\frac{7}{12}$ and $\frac{1}{2}$. I can ——
13. Find the product of $\frac{7}{12}$ and 2. 2 times ——
14. Find the quotient of $\frac{8}{12} \div \frac{2}{12}$. $\frac{2}{12}$ are con——
15. Find the quotient of $\frac{1}{6} \div 2$. $\frac{1}{2}$ of $\frac{1}{6} =$

16. Find the sum of $\frac{1}{6}$ and $\frac{1}{2}$. I can change ——
17. Find the difference of $\frac{5}{6}$ and $\frac{1}{2}$. I can ——
18. Find the product of $\frac{1}{6}$ and 5. 5 times ——
19. Find the quotient of $2 \div \frac{1}{8}$. $\frac{1}{8}$ is con——
20. Find the quotient of $\frac{1}{2} \div 4$. $\frac{1}{4}$ of $\frac{1}{2}$ ——

REVIEW.

(Do not omit).

(a) Tell the meaning of the expression. (b) Complete the statement. (c) Tell the suggested number story.

$\frac{1}{2} + \frac{1}{4}$ $\frac{1}{2} - \frac{1}{4}$ $\frac{1}{4} \times 6$

2 pecks $\div$ $\frac{1}{4}$ of a peck. $\frac{1}{4}$ of a peck $\div$ 2.

Make the pupils familiar with that for which the word quart stands.

1. The sum of 3¼ quarts and 2½ quarts is —— and —— —— quarts.

2. The difference of 3½ quarts and 2¼ quarts is —— and —— —— quarts.

3. The product of 2¼ quarts and 3 is—— and —— —— quarts.

4. The quotient of 2½ quarts divided by ½ of a quart is ——.

5. The quotient of 2½ quarts divided by 2 is —— and —— —— quarts.

6. Mr. Dow sold 2½ quarts of milk to one customer and 4½ quarts to another; to both he sold —— quarts.

7. Mr. Grant's old red cow gives 10 quarts of milk a day; he sells 4½ quarts and has —— and —— —— quarts for use at home.

8. Mr. Dow, the milk man, has three customers on State Street; each takes 1½ quarts of milk a day; to supply these three customers —— and —— —— quarts of milk are required.

9. Mr. Dow put 6 quarts of milk into pint bottles; —— bottles were required.

10. Mr. Dow divided 6½ quarts of milk equally between 2 calves; each calf received —— and —— —— quarts.

SLATE WORK.

(See models on page 29.)

$\frac{3}{4} + \frac{2}{3}$ $\frac{1}{3} - \frac{1}{4}$ $\frac{2}{3} \times 4$

$\frac{4}{5} + \frac{1}{2}$ $\frac{3}{4} - \frac{1}{3}$ $\frac{5}{7} \times 2$

1. Add $3\frac{1}{2}$ and $\frac{1}{4}$. $3\frac{1}{2} + \frac{1}{4} =$
2. From $3\frac{1}{2}$ subtract $\frac{1}{4}$. $3\frac{1}{2} - \frac{1}{4} =$
3. Multiply $3\frac{1}{2}$ by 3. * $3\frac{1}{2} \times 3 =$
4. Divide $3\frac{1}{2}$ by $\frac{1}{2}$. * $3\frac{1}{2} \div \frac{1}{2} =$
5. Divide $\frac{1}{2}$ by 5. * $\frac{1}{2} \div 5 =$

6. Add $2\frac{1}{3}$ and $\frac{1}{6}$. $2\frac{1}{3} + \frac{1}{6} =$
7. From $2\frac{1}{3}$ subtract $\frac{1}{6}$. $2\frac{1}{3} - \frac{1}{6} =$
8. Multiply $2\frac{1}{3}$ by 2. * $2\frac{1}{3} \times 2 =$
9. Divide $2\frac{1}{3}$ by $\frac{1}{3}$. * $2\frac{1}{3} \div \frac{1}{3} =$
10. Divide $\frac{1}{2}$ by 6. * $\frac{1}{2} \div 6 =$

11. $4\frac{1}{4} + \frac{1}{8}$, means, ______________. $4\frac{1}{4} + \frac{1}{8} =$
12. $4\frac{1}{4} - \frac{1}{8}$, means, ______________. $4\frac{1}{4} - \frac{1}{8} =$
13. $4\frac{1}{4} \times 2$, means, ______________. $4\frac{1}{4} \times 2 =$
14. $2\frac{1}{4} \div \frac{1}{4}$, means, ______________. $2\frac{1}{4} \div \frac{1}{4} =$
15. $\frac{1}{3} \div 4$, means, ______________. $\frac{1}{3} \div 4 =$

16. $2\frac{1}{5} + \frac{1}{10}$, means, ______________. $2\frac{1}{5} + \frac{1}{10} =$
17. $2\frac{1}{5} - \frac{1}{10}$, means, ______________. $2\frac{1}{5} - \frac{1}{10} =$
18. $2\frac{1}{2} \times 2$, means, ______________. $2\frac{1}{2} \times 2 =$
19. $2\frac{1}{5} \div \frac{1}{5}$, means, ______________. $2\frac{1}{5} \div \frac{1}{5} =$
20. $\frac{1}{3} \div 3$, means, ______________. $\frac{1}{3} \div 3 =$
21. One fifth of a dollar is contained in $2\frac{2}{5}$ dollars ______ times.

REVIEW.

(Do not omit).

(a) Tell the meaning of the expression. (b) Complete the statement. (c) Tell the suggested number story.

$\frac{1}{2} + \frac{1}{6}$ $\frac{1}{2} - \frac{1}{6}$ $\frac{2}{3} \times 2$

2 yards ÷ $\frac{1}{3}$ of a yard. $\frac{1}{3}$ of a yard ÷ 2.

Tell the meaning of the expression *before attempting to solve the problem.*

Review page 7.

1. The sum of $1\frac{1}{4}$ inches and $1\frac{3}{4}$ inches is —— inches.

2. The difference of $2\frac{3}{4}$ inches and $\frac{1}{2}$ of an inch is —— and —— —— inches.

3. The product of $2\frac{1}{8}$ inches and 5 is —— and —— —— inches.

4. The quotient of $\frac{6}{8}$ of an inch divided by $\frac{2}{8}$ of an inch is ——.

5. The quotient of $4\frac{1}{2}$ inches divided by 2 is —— and —— —— inches.

6. Jane's pencil is $3\frac{1}{2}$ inches long; Alice's pencil is $1\frac{1}{2}$ inches longer than Jane's; Alice's pencil is —— inches long.

7. Hattie's slate is 8 inches wide; the width of Annie's slate is $1\frac{1}{2}$ inches less than the width of Hattie's; Annie's slate is —— and —— —— inches wide.

8. Ella has a doll that is $6\frac{1}{2}$ inches tall; Emma has one that is 3 times as tall; Emma's doll is —— and —— —— inches high.

9. Bettie had a stick of candy 4 inches long; she divided it among her dolls giving to each doll a piece $\frac{1}{2}$ an inch long; she had —— dolls.

10. If I should divide a line $8\frac{1}{2}$ inches long into 2 equal parts, each part would be —— and —— —— inches long.

SLATE WORK.

(See models on page 29.)

$\frac{2}{5} + \frac{1}{2}$ $\frac{3}{5} - \frac{1}{2}$ $\frac{3}{5} \times 5$

$\frac{3}{4} + \frac{5}{6}$ $\frac{1}{2} - \frac{2}{5}$ $\frac{5}{7} \times 3$

Use diagrams similar to those appearing on pp. 11, 13, 15, and 17, and teach orally the number facts that must be apprehended by the pupil before he can read this page.

1. One half of 1 third is ______ ______. $\frac{1}{2}$ of $\frac{1}{3}$ =
2. One half of 2 thirds is ______ ______. $\frac{1}{2}$ of $\frac{2}{3}$ =

3. One half of 1 fourth is ______ ______. $\frac{1}{2}$ of $\frac{1}{4}$ =
4. One half of 2 fourths is ______ ______. $\frac{1}{2}$ of $\frac{2}{4}$ =
5. One half of 3 fourths is ______ ______. $\frac{1}{2}$ of $\frac{3}{4}$ =

6. One half of 1 fifth is ______ ______. $\frac{1}{2}$ of $\frac{1}{5}$ =
7. One half of 2 fifths is ______ ______. $\frac{1}{2}$ of $\frac{2}{5}$ =
8. One half of 3 fifths is ______ ______. $\frac{1}{2}$ of $\frac{3}{5}$ =
9. One half of 4 fifths is ______ ______. $\frac{1}{2}$ of $\frac{4}{5}$ =

10. One half of 1 sixth is ______ ______. $\frac{1}{2}$ of $\frac{1}{6}$ =
11. One half of 2 sixths is ______ ______. $\frac{1}{2}$ of $\frac{2}{6}$ =
12. One half of 3 sixths is ______ ______. $\frac{1}{2}$ of $\frac{3}{6}$ =
13. One half of 4 sixths is ______ ______. $\frac{1}{2}$ of $\frac{4}{6}$ =
14. One half of 5 sixths is ______ ______. $\frac{1}{2}$ of $\frac{5}{6}$ =

15. One third of 1 third is ______ ______. $\frac{1}{3}$ of $\frac{1}{3}$ =
16. One third of 2 thirds is ______ ______. $\frac{1}{3}$ of $\frac{2}{3}$ =

17. One third of 1 fourth is ______ ______. $\frac{1}{3}$ of $\frac{1}{4}$ =
18. One third of 2 fourths is ______ ______. $\frac{1}{3}$ of $\frac{2}{4}$ =
19. One third of 3 fourths is ______ ______. $\frac{1}{3}$ of $\frac{3}{4}$ =

20. One fourth of 1 third is ______ ______. $\frac{1}{4}$ of $\frac{1}{3}$ =
21. One fourth of 2 thirds is ______ ______. $\frac{1}{4}$ of $\frac{2}{3}$ =

SLATE WORK.

(See models on page 29.)

$\frac{1}{6} + \frac{1}{4}$	$\frac{5}{6} - \frac{1}{4}$	$\frac{5}{6} \times 3$
$\frac{5}{6} + \frac{1}{4}$	$\frac{5}{6} - \frac{3}{4}$	$\frac{3}{7} \times 4$

REVIEW.

(For Drill.)

Read, *first by line*, afterwards by column, until every pupil can give the twenty statements by column *in fifty seconds or less.*

$\frac{2}{4} = 2 \qquad \frac{2}{6} = - \qquad \frac{3}{6} = - \qquad \frac{4}{6} = -$

$\frac{6}{6} = \qquad \frac{2}{8} = - \qquad \frac{4}{8} = - \qquad \frac{6}{8} = -$

$\frac{2}{10} = - \qquad \frac{4}{10} = - \qquad \frac{6}{10} = - \qquad \frac{8}{10} = -$

$\frac{10}{10} = \qquad \frac{2}{12} = - \qquad \frac{4}{12} = - \qquad \frac{6}{12} = -$

$\frac{8}{12} = - \qquad \frac{10}{12} = - \qquad \frac{12}{12} = \qquad \frac{13}{12} =$

REVIEW.

(For Drill.)

Read, *first by line*, afterwards by column. Continue the drill until every pupil can read any one of the four columns *in thirty seconds or less.*

$\frac{1}{2}$ of $\frac{1}{2}$ = $\qquad \frac{1}{2}$ of $\frac{1}{3}$ = $\qquad \frac{1}{2}$ of $\frac{2}{3}$ = $\qquad \frac{1}{2}$ of $\frac{1}{4}$ =

$\frac{1}{2}$ of $\frac{2}{4}$ = $\qquad \frac{1}{2}$ of $\frac{3}{4}$ = $\qquad \frac{1}{2}$ of $\frac{1}{5}$ = $\qquad \frac{1}{2}$ of $\frac{2}{5}$ =

$\frac{1}{2}$ of $\frac{3}{5}$ = $\qquad \frac{1}{2}$ of $\frac{4}{5}$ = $\qquad \frac{1}{2}$ of $\frac{1}{6}$ = $\qquad \frac{1}{2}$ of $\frac{2}{6}$ =

$\frac{1}{2}$ of $\frac{3}{6}$ = $\qquad \frac{1}{2}$ of $\frac{4}{6}$ = $\qquad \frac{1}{2}$ of $\frac{5}{6}$ = $\qquad \frac{1}{3}$ of $\frac{1}{2}$ =

$\frac{1}{3}$ of $\frac{1}{3}$ = $\qquad \frac{1}{3}$ of $\frac{2}{3}$ = $\qquad \frac{1}{3}$ of $\frac{1}{4}$ = $\qquad \frac{1}{3}$ of $\frac{2}{4}$ =

$\frac{1}{3}$ of $\frac{3}{4}$ = $\qquad \frac{1}{4}$ of $\frac{1}{2}$ = $\qquad \frac{1}{4}$ of $\frac{1}{3}$ = $\qquad \frac{1}{4}$ of $\frac{2}{3}$ =

SLATE WORK.

Model.

$$\begin{array}{r} 5\frac{1}{2} + 3\frac{1}{3} \\ \hline 5\frac{1}{2} = 5\frac{3}{6} \\ 3\frac{1}{3} = 3\frac{2}{6} \\ \hline 8\frac{5}{6} \end{array}$$

Model.

$$\begin{array}{r} 6\frac{1}{2} - 2\frac{1}{3} \\ \hline 6\frac{1}{2} = 6\frac{3}{6} \\ 2\frac{1}{3} = 2\frac{2}{6} \\ \hline 4\frac{1}{6} \end{array}$$

Model.

$$\begin{array}{r} 4\frac{1}{6} \times 5 \\ \hline 4\frac{1}{6} \\ 5 \\ \hline 20\frac{5}{6} \end{array}$$

In the manner shown in the models, require the pupil to solve the following upon slate or paper.

$8\frac{1}{2} + 2\frac{2}{5} \qquad 6\frac{1}{2} - 3\frac{2}{5} \qquad 3\frac{1}{5} \times 4$

$5\frac{1}{5} + 4\frac{1}{2} \qquad 4\frac{3}{5} - 2\frac{1}{2} \qquad 4\frac{1}{4} \times 3$

1. Add $2\frac{1}{2}$ and $1\frac{1}{2}$. $2\frac{1}{2} + 1\frac{1}{2} =$
2. From 5 subtract $\frac{3}{4}$. $5 - \frac{3}{4} =$
3. Multiply $2\frac{1}{2}$ by 2. * $2\frac{1}{2} \times 2 =$
4. Divide $1\frac{1}{2}$ by $\frac{1}{4}$. * $1\frac{1}{2} \div \frac{1}{4} =$
5. Divide $\frac{2}{3}$ by 2. * $\frac{2}{3} \div 2 =$

6. Add $2\frac{3}{4}$ and $2\frac{1}{4}$. $2\frac{3}{4} + 2\frac{1}{4} =$
7. From 5 subtract $\frac{2}{5}$. $5 - \frac{2}{5} =$
8. Multiply $2\frac{1}{3}$ by 3. * $2\frac{1}{3} \times 3 =$
9. Divide $1\frac{1}{3}$ by $\frac{1}{3}$. * $1\frac{1}{3} \div \frac{1}{3} =$
10. Divide $\frac{2}{4}$ by 2. * $\frac{2}{4} \div 2 =$

11. $2\frac{1}{5} + 2\frac{4}{5}$, means, ______________. $2\frac{1}{5} + 2\frac{4}{5} =$
12. $5 - \frac{5}{6}$, means, ______________. $5 - \frac{5}{6} =$
13. $2\frac{1}{4} \times 4$, means, ______________. $2\frac{1}{4} \times 4 =$
14. $1\frac{3}{4} \div \frac{1}{4}$, means, ______________. $1\frac{3}{4} \div \frac{1}{4} =$
15. $\frac{3}{4} \div 2$, means, ______________. $\frac{3}{4} \div 2 =$

16. $3\frac{2}{5} + 3\frac{3}{5}$. means, ______________. $3\frac{2}{5} + 3\frac{3}{5} =$
17. $5 - \frac{2}{3}$, means, ______________. $5 - \frac{2}{3} =$
18. $2\frac{1}{5} \times 5$, means, ______________. $2\frac{1}{5} \times 5 =$
19. $1\frac{2}{5} \div \frac{1}{5}$, means, ______________. $1\frac{2}{5} \div \frac{1}{5} =$
20. $\frac{2}{5} \div 2$, means, ______________. $\frac{2}{5} \div 2 =$

REVIEW.

(Do not omit.)

(a) Tell the meaning of the expression. (b) Complete the statement. (c) Tell the suggested number story.

$\frac{1}{2} + \frac{1}{8}$ $\frac{1}{2} - \frac{1}{8}$ $\frac{3}{4} \times 2$

2 inches ÷ $\frac{1}{2}$ an inch. $\frac{1}{2}$ an inch ÷ 2.

*Tell the meaning of the expression *before attempting to solve the problem.*

See that the pupil is familiar with the aliquot parts of a dollar.

1. The sum of $2\frac{7}{10}$ dollars and $2\frac{3}{10}$ dollars is —— dollars.

2. The difference of $2\frac{3}{4}$ dollars and $1\frac{1}{2}$ dollars is —— and —— —— dollars.

3. The product of $3\frac{1}{4}$ dollars and 5 is —— and —— —— dollars.

4. The quotient of $2\frac{3}{4}$ dollars divided by $\frac{1}{4}$ of a dollar is ——.

5. The quotient of $6\frac{1}{5}$ dollars divided by 2 is —— and —— —— dollars.

6. Samuel paid $2\frac{1}{2}$ dollars for a hat and $2\frac{3}{4}$ dollars for a pair of boots; for both he paid —— and —— —— dollars.

7. Peter bought a suit of clothes; the price was $8\frac{1}{2}$ dollars; he gave the merchant a 10-dollar bill; the merchant should give Peter ————————.

8. At $\frac{3}{4}$ of a dollar a yard, 3 yards of cloth cost ————————.

9. Coffee costs $\frac{3}{10}$ of a dollar a pound; with $\frac{9}{10}$ of a dollar I can buy —— pounds; with one dollar I can buy —— and —— —— pounds.

10. Helen paid $\frac{3}{5}$ of a dollar for 2 yards of ribbon; 1 yard cost —— —— of a dollar; 3 yards would cost —— —— of a dollar.

SLATE WORK.

(See models on page 36.)

$7\frac{1}{3} + 3\frac{1}{4}$

$5\frac{2}{3} + 4\frac{1}{4}$

$6\frac{1}{3} - 2\frac{1}{4}$

$4\frac{2}{3} - 1\frac{1}{4}$

$8\frac{1}{3} \times 2$

$5\frac{1}{7} \times 4$

1. Add $3\frac{3}{5}$ and $3\frac{3}{5}$. $3\frac{3}{5} + 3\frac{3}{5} =$
2. From 5 subtract $1\frac{1}{2}$. $5 - 1\frac{1}{2} =$
3. Multiply $2\frac{1}{3}$ by 4. * $2\frac{1}{3} \times 4 =$
4. Divide $1\frac{1}{3}$ by $\frac{1}{6}$. * $1\frac{1}{3} \div \frac{1}{6} =$
5. Divide $\frac{3}{5}$ by 2. * $\frac{3}{5} \div 2 =$

6. Add $4\frac{2}{3}$ and $4\frac{2}{3}$. $4\frac{2}{3} + 4\frac{2}{3} =$
7. From 5 subtract $1\frac{2}{3}$. $5 - 1\frac{2}{3} =$
8. Multiply $2\frac{1}{4}$ by 5. * $2\frac{1}{4} \times 5 =$
9. Divide $1\frac{1}{4}$ by $\frac{1}{8}$. * $1\frac{1}{4} \div \frac{1}{8} =$
10. Divide $\frac{4}{5}$ by 2. * $\frac{4}{5} \div 2 =$
11. $2\frac{4}{7} + 2\frac{4}{7}$, means, ————————. $2\frac{4}{7} + 2\frac{4}{7} =$
12. $5 - 1\frac{3}{4}$, means, ————————. $5 - 1\frac{3}{4} =$
13. $3\frac{1}{5} \times 6$, means, ————————. $3\frac{1}{5} \times 6 =$
14. $1\frac{1}{5} \div \frac{1}{10}$, means, ————————. $1\frac{1}{5} \div \frac{1}{10} =$
15. $\frac{2}{6} \div 2$, means, ————————. $\frac{2}{6} \div 2 =$

16. $2\frac{5}{9} + 2\frac{5}{9}$, means, ————————. $2\frac{5}{9} + 2\frac{5}{9} =$
17. $5 - 1\frac{4}{5}$, means, ————————. $5 - 1\frac{4}{5} =$
18. $3\frac{1}{6} \times 7$, means, ————————. $3\frac{1}{6} \times 7 =$
19. $1\frac{1}{6} \div \frac{1}{12}$, means, ————————. $1\frac{1}{6} \div \frac{1}{12} =$
20. $\frac{5}{6} \div 2$, means, ————————. $\frac{5}{6} \div 2 =$
21. One half of $\frac{5}{6}$ of a foot is ——— ——— of a foot.

REVIEW.

(Do not omit.)

(a) Tell the meaning of the expression. (b) Complete the statement (c) Tell the suggested number story.

$\frac{1}{2} + \frac{3}{10}$ $\frac{1}{2} - \frac{3}{10}$ $\frac{3}{10} \times 3$

3 feet $\div \frac{1}{2}$ a foot. $\frac{1}{2}$ a foot $\div$ 3.

*Tell the meaning of the expression *before attempting to solve the problem.*

10 cents = 1 dime.	**$\frac{1}{5}$ of a dime = 2 cents.**
10 dimes = 1 dollar.	**$\frac{1}{2}$ of a dime = 5 cents.**

1. The sum of $3\frac{1}{2}$ dimes and $3\frac{1}{5}$ dimes is —— and —— ——dimes.

2. The difference of $4\frac{1}{2}$ dimes and $2\frac{1}{5}$ dimes is —— and —— —— dimes.

3. The product of $3\frac{2}{5}$ dimes and 2 is —— and —— —— dimes.

4. The quotient of $2\frac{2}{5}$ dimes divided by $\frac{1}{5}$ of a dime is ——.

5. The quotient of $8\frac{1}{5}$ dimes divided by 2 is —— and —— —— dimes.

6. Henry paid $2\frac{1}{2}$ dimes for a slate and 2 dimes for a book; for both he paid —— and —— —— dimes, or —— cents.

7. Benjamin had 5 dimes; he spent $2\frac{2}{5}$ dimes; he then had —— and —— —— dimes, or —— cents.

8. At $3\frac{1}{2}$ dimes a pound, 2 pounds of coffee cost —— dimes, or —— cents.

9. Pencils cost $\frac{1}{2}$ of a dime each; with 2 dimes I can buy —— pencils; with 3 dimes I can buy —— pencils.

10. Clyde paid $\frac{4}{5}$ of a dime for 2 pencils; one pencil cost —— —— of a dime, or —— cents; at the same rate, 5 pencils would cost ————————.

SLATE WORK.

(See models on page 36.)

$8\frac{3}{4} + 2\frac{1}{8}$	$7\frac{3}{4} - 3\frac{1}{8}$	$3\frac{1}{7} \times 5$
$5\frac{1}{4} + 3\frac{3}{8}$	$6\frac{3}{8} - 2\frac{1}{4}$	$2\frac{1}{9} \times 4$

Explain to the pupil that 4 multiplied by $\frac{1}{2}$, means, $\frac{1}{2}$ of 4; 6 multiplied by $\frac{1}{3}$, means, $\frac{1}{3}$ of 6; $3\frac{1}{2}$ times 4, means, 3 fours and $\frac{1}{2}$ of another 4, etc. Throughout this book the sign × is to be read *multiplied by*, not *times*. Hesitation on the part of the pupil in reading this and other pages, may often best be met with the question, *What does the expression mean?*

4 dollars $\times \frac{1}{2}$. (To be read, *4 dollars multiplied by $\frac{1}{2}$.*)

(a) 4 dollars $\times \frac{1}{2}$, means, *find $\frac{1}{2}$ of 4 dollars.*

(b) $\frac{1}{2}$ of 4 dollars is —— dollars.

(c) At 4 dollars a yard, $\frac{1}{2}$ a yard of cloth costs —— dollars.

1. 6 dollars multiplied by 3 = $6 \times 3 =$
2. 6 dollars multiplied by 2 = $6 \times 2 =$
3. 6 dollars multiplied by 1 = $6 \times 1 =$
4. 6 dollars multiplied by $\frac{1}{2}$ = $6 \times \frac{1}{2} =$

5. 4×3, means, *3 times 4.* 3 times 4 =
6. $4 \times 3\frac{1}{2}$, means, $3\frac{1}{2}$ times 4. $3\frac{1}{2}$ times 4 =

7. 6×2, means, ————————. 2 times 6 =
8. $6 \times 2\frac{1}{2}$, means, ————————. $2\frac{1}{2}$ times 6 =
9. $6 \times 2\frac{1}{3}$, means, ————————. $2\frac{1}{3}$ times 6 =
10. $6 \times 2\frac{2}{3}$, means, ————————. $2\frac{2}{3}$ times 6 =

11. $4 \times 3 =$ $4 \times 2 =$ $4 \times 1 =$ $4 \times \frac{1}{2} =$
12. $6 \times 3 =$ $6 \times 2 =$ $6 \times 1 =$ $6 \times \frac{1}{3} =$
13. $8 \times 3 =$ $8 \times 2 =$ $8 \times 1 =$ $8 \times \frac{1}{4} =$
14. $5 \times 3 =$ $5 \times 2 =$ $5 \times 1 =$ $5 \times \frac{1}{5} =$

REVIEW.

(Do not omit.)

(a) Tell the meaning of the expression. (b) Complete the statement. (c) Tell the suggested number story.

$6\frac{1}{2}$ dollars $\times 2$. $6\frac{1}{2}$ dollars $\times \frac{1}{2}$.

5 dollars $\div \frac{1}{2}$ a dollar. $\frac{1}{2}$ a dollar $\div 5$.

Require pupils to tell the meaning of the expressions used in Nos. 1 to 6 inclusive, *before* an attempt is made to complete the statements. Do this *many times* if necessary. Do not ask the pupil to multiply $\frac{1}{4}$ by $\frac{1}{2}$, until he *knows* that this expression means, *find $\frac{1}{2}$ of $\frac{1}{4}$*.

1. $4\frac{1}{4}$ bushels + $2\frac{3}{8}$ bushels =
2. 6 bushels − $1\frac{7}{8}$ bushels =
3. $2\frac{1}{8}$ bushels × 8 = * $2\frac{1}{2}$ × 4 = *
4. $6\frac{1}{2}$ bushels × $\frac{1}{2}$ = * $\frac{1}{4}$ × $\frac{1}{2}$ = *
5. $2\frac{1}{4}$ bushels ÷ $\frac{1}{8}$ of a bushel = *
6. $8\frac{1}{2}$ bushels ÷ 4 = * $6\frac{1}{2}$ ÷ 3 = *

7. In one grain bag, I put $2\frac{1}{2}$ bushels of oats; in another, I put $2\frac{5}{8}$ bushels; in both bags there were ————————.

8. In the morning, Mr. Adams put $2\frac{1}{4}$ bushels of oats into a grain bag; at noon he took out $\frac{3}{4}$ of a bushel to feed his horses; there were left in the bag —— and —— —— bushels.

9. Mr. Miller's horses eat 6 bushels of oats each week; in $3\frac{1}{2}$ weeks they eat —— bushels. 6 multiplied by $3\frac{1}{2}$, means, 3 sixes and $\frac{1}{2}$ of another six. 6 × $3\frac{1}{2}$ =

10. Mrs. Miller's chickens eat $1\frac{1}{2}$ bushels of corn each month; in $\frac{1}{2}$ of a month they eat —— —— of a bushel. $1\frac{1}{2}$ multiplied by $\frac{1}{2}$, means, $\frac{1}{2}$ of $1\frac{1}{2}$. $1\frac{1}{2}$ × $\frac{1}{2}$ =

11. John Miller divided a bag of oats in which there were $2\frac{1}{4}$ bushels, among his horses, giving to each horse $\frac{1}{4}$ of a bushel; he had —— horses.

12. Henry Miller divided $\frac{3}{4}$ of a bushel of oats equally between 2 horses; each horse received —— —— of a bushel.

13. Mrs. Miller's family consumes $\frac{1}{8}$ of a bushel of potatoes each day; $2\frac{1}{2}$ bushels would be consumed in —— days.

* **Tell the meaning of the expression *before attempting to solve the problem.***

The thoughtful teacher will quickly perceive the object of the work on this page. In fraction work, the greater part of the difficulty vanishes, when the pupil knows what is required—*what the problem presented means.*

1. $4\frac{3}{4} + \frac{1}{2}$, means, ________. $4\frac{3}{4} + \frac{1}{2} =$
2. $4\frac{3}{4} - \frac{1}{2}$, means, ________. $4\frac{3}{4} - \frac{1}{2} =$
3. $4\frac{1}{2} \times 2$, means, 2 times $4\frac{1}{2}$. 2 times $4\frac{1}{2} =$
4. $4\frac{1}{2} \times \frac{1}{2}$, means, $\frac{1}{2}$ of $4\frac{1}{2}$. $\frac{1}{2}$ of $4\frac{1}{2} =$
5. $4\frac{1}{2} \div \frac{1}{2}$, means, ________. $\frac{1}{2}$ is con ——
6. $\frac{1}{2} \div 4$, means, ________. $\frac{1}{4}$ of $\frac{1}{2} =$

7. $4\frac{5}{8} + \frac{1}{2}$, means, ________. $4\frac{5}{8} + \frac{1}{2} =$
8. $4\frac{5}{8} - \frac{1}{2}$. means, ________. $4\frac{5}{8} - \frac{1}{2} =$
9. $4\frac{3}{8} \times 2$, means, ________. $4\frac{3}{8} \times 2 =$
10. $4\frac{1}{4} \times \frac{1}{2}$, means, ________. $4\frac{1}{4} \times \frac{1}{2} =$
11. $4\frac{3}{4} \div \frac{1}{4}$, means, ________. $4\frac{3}{4} \div \frac{1}{4} =$
12. $\frac{2}{3} \div 3$, means, ________. $\frac{2}{3} \div 3 =$

13. $6 \times 3\frac{1}{2}$, means, ________. $6 \times 3\frac{1}{2} =$
14. $6 \times \frac{1}{3}$, means, ________. $6 \times \frac{1}{3} =$
15. $4 \div \frac{1}{3}$, means, ________. $4 \div \frac{1}{3} =$
16. $\frac{1}{3} \div 4$, means, ________. $\frac{1}{3} \div 4 =$

17. $2 \times 4\frac{1}{2}$, means, ________. $2 \times 4\frac{1}{2} =$
18. $8 \times \frac{1}{4}$, means, ________. $8 \times \frac{1}{4} =$
19. $3 \div \frac{1}{4}$, means, ________. $3 \div \frac{1}{4} =$
20. $\frac{1}{4} \div 3$, means, ________. $\frac{1}{4} \div 3 =$
21. One fourth of a yard divided by 3, means, find one third of $\frac{1}{4}$ of a yard. One third of $\frac{1}{4}$ of a yard is ———— of a yard.

SLATE WORK.

(See models on page 36).

$8\frac{3}{4} + 2\frac{1}{2}$ $8\frac{3}{4} - 2\frac{1}{2}$ $6\frac{1}{3} \times 4$

$8\frac{4}{5} + 2\frac{1}{2}$ $8\frac{4}{5} - 2\frac{1}{2}$ $8\frac{1}{4} \times 5$

See that the pupil is familiar with that for which the word gallon stands.

1. $2\frac{5}{8}$ gallons $+$ $2\frac{1}{2}$ gallons $=$
2. 5 gallons $-$ $2\frac{5}{8}$ gallons $=$
3. $2\frac{5}{8}$ gallons $\times 2 =$ * $2\frac{1}{2} \times 6 =$ *
4. $8\frac{1}{2}$ gallons $\times \frac{1}{4} =$ * $\frac{1}{2} \times \frac{1}{4} =$ *
5. $1\frac{3}{4}$ gallons $\div \frac{1}{8}$ of a gallon $=$ *
6. $6\frac{1}{4}$ gallons $\div 2 =$ * $6\frac{1}{4} \div 3 =$ *

7. In one milk-can, I put $2\frac{1}{2}$ gallons of milk; in another, I put $2\frac{7}{8}$ gallons; in both cans there were ______________________.

8. Mr. Dow, the milk-man, put $6\frac{1}{2}$ gallons of milk in a can; from this he sold $\frac{3}{4}$ of a gallon; there were left in the can ______________________ gallons.

9. Mr. Reed's cow gives $2\frac{1}{4}$ gallons of milk a day; in 7 days she gives ______________________.

10. Mrs. Smith sells skimmed milk at 10 cents a gallon; for $4\frac{1}{2}$ gallons she receives ______ cents. 10 cents multiplied by $4\frac{1}{2}$ means, *4 times 10 cents and $\frac{1}{2}$ of another 10 cents.*

10 cents $\times 3\frac{1}{2} =$ 10 cents $\times 2\frac{1}{2} =$
10 cents $\times 1\frac{1}{2} =$ 10 cents $\times \frac{1}{2} =$

11. Mr. Dow, the milk-man, divided a can of milk in which there were $4\frac{1}{2}$ gallons, among his customers on Washington Street, giving to each $\frac{1}{2}$ of a gallon; he had ______ customers on Washington Street.

12. Mrs. Dow divided $\frac{3}{8}$ of a gallon of milk equally among 3 hungry children; each child received ____________ of a gallon. One eighth of a gallon is what part of 3 eighths of a gallon? One eighth of a gallon is ____________ of 3 eighths of a gallon.

***Tell the meaning of the expression *before* attempting to solve the problem.**

It will be observed that fractional quotients appear upon this page. This work is introduced as a preparation for the more difficult work in division of fractions, which is begun on page 47. Read again "SUGGESTIONS TO TEACHERS" on pages 3 and 4, and note especially section 2.

1. 2 is contained in 6 —— times.
2. 2 is contained in 7 —— and —— —— times.
3. 3 is contained in 6 —— times.
4. 3 is contained in 7 —— and —— —— times.
5. 3 is contained in 8 —— and —— —— times.

6. $8 \div 4 =$ $9 \div 4 =$ $10 \div 4 =$ $11 \div 4 =$
7. $10 \div 5 =$ $11 \div 5 =$ $12 \div 5 =$ $13 \div 5 =$
8. $12 \div 6 =$ $13 \div 6 =$ $14 \div 6 =$ $15 \div 6 =$
9. $14 \div 7 =$ $15 \div 7 =$ $16 \div 7 =$ $17 \div 7 =$

10. 2 sixths are contained in 4 sixths ————.
11. 2 sixths are contained in 5 sixths ————.
12. 3 ninths are contained in 6 ninths ————.
13. 3 ninths are contained in 7 ninths ————.
14. 3 ninths are contained in 8 ninths ————.

15. $\frac{4}{12}$ are contained in $\frac{8}{12}$ —— times.
16. $\frac{4}{12}$ are contained in $\frac{9}{12}$ —— and —— —— times.
17. $\frac{4}{12}$ are contained in $\frac{10}{12}$ —— and —— —— times.
18. $\frac{4}{12}$ are contained in $\frac{11}{12}$ —— and —— —— times.

19. $\frac{6}{10} \div \frac{3}{10} =$ $\frac{7}{10} \div \frac{3}{10} =$ $\frac{8}{10} \div \frac{3}{10} =$ $\frac{5}{10} \div \frac{3}{10} =$
20. $\frac{8}{11} \div \frac{4}{11} =$ $\frac{9}{11} \div \frac{4}{11} =$ $\frac{10}{11} \div \frac{4}{11} =$ $\frac{5}{11} \div \frac{4}{11} =$
21. $\frac{10}{12} \div \frac{5}{12} =$ $\frac{11}{12} \div \frac{5}{12} =$ $\frac{6}{12} \div \frac{5}{12} =$ $\frac{7}{12} \div \frac{5}{12} =$

22. $\frac{2}{10}$ of a dollar are contained in $\frac{5}{10}$ of a dollar —— and —— —— times.

23. $\frac{7}{8}$ of a peck $\div$ $\frac{2}{8}$ of a peck =

24. $\frac{3}{8}$ of a bushel are contained in $\frac{7}{8}$ of a bushel —— and —— —— times.

Teach the meaning and use of the sign, $.

1. When flour costs $6 a barrel,—

3 barrels of flour cost ———. $\$6 \times 3 =$
2 barrels of flour cost ———. $\$6 \times 2 =$
1 barrel of flour costs ———. $\$6 \times 1 =$
$\frac{1}{2}$ barrel of flour costs ———. $\$6 \times \frac{1}{2} =$

2. When apples cost $\$\frac{1}{2}$ a bushel,—

3 bushels of apples cost ———. $\$\frac{1}{2} \times 3 =$
2 bushels of apples cost ———. $\$\frac{1}{2} \times 2 =$
1 bushel of apples costs ———. $\$\frac{1}{2} \times 1 =$
$\frac{1}{2}$ bushel of apples costs ———. $\$\frac{1}{2} \times \frac{1}{2} =$

3. When coal costs $4 a ton,—

For $8, I can buy ——— tons. $\$8 \div \$4 =$
For $7, I can buy —————. $\$7 \div \$4 =$
For $6, I can buy —————. $\$6 \div \$4 =$
For $5, I can buy —————. $\$5 \div \$4 =$
For $4, I can buy —————. $\$4 \div \$4 =$
For $3, I can buy —————. $\$3 \div \$4 =$

4. When oranges cost $\$\frac{4}{10}$ a dozen,—

For $\$\frac{8}{10}$, I can buy ——— dozen. $\$\frac{8}{10} \div \$\frac{4}{10} =$
For $\$\frac{7}{10}$, I can buy —————. $\$\frac{7}{10} \div \$\frac{4}{10} =$
For $\$\frac{6}{10}$, I can buy —————. $\$\frac{6}{10} \div \$\frac{4}{10} =$
For $\$\frac{5}{10}$, I can buy —————. $\$\frac{5}{10} \div \$\frac{4}{10} =$

5. Miss Reed paid $\$\frac{5}{10}$ for ribbon at $\$\frac{2}{10}$ a yard; she bought ——— yards. $\$\frac{5}{10} \div \$\frac{2}{10} =$

6. Miss Rice bought $4\frac{1}{2}$ yards of lace at $\$\frac{1}{2}$ a yard; the lace cost —————————.

$\$\frac{1}{2} \times 4\frac{1}{2}$, means, —————. $\$\frac{1}{2} \times 4\frac{1}{2} =$

7. $\$8 \times 2$, means, —————. $\$8 \times \frac{1}{2}$, means, ———.

8. $\frac{5}{8}$ of a bushel $\div$ $\frac{2}{8}$ of a bushel, means, —————.

Up to this time the pupil has solved problems in the first "case" of division of fractions by inspection, and, perhaps, without realizing that he changes the numbers to be compared, *into like units.* He may now be given more difficult problems and be led to take the several thought steps presented on this page. Say nothing about "inverting the divisor."

1. Find the quotient of $\frac{3}{4} \div \frac{1}{3}$.

This means, find how many times $\frac{1}{3}$ is contained in $\frac{3}{4}$.
I can change thirds and fourths to ———. $\frac{1}{3}$ = ——— twelfths. $\frac{3}{4}$ = ——— twelfths.
4 twelfths are contained in 9 twelfths —————.

2. 4 apples are contained in 9 apples —————.
3. 4 dollars are contained in 9 dollars —————.
4. 4 tenths are contained in 9 tenths —————.
5. 4 bushels are contained in 9 bushels —————.
6. 4 elevenths are contained in 9 elevenths —————.
7. 5 apples are contained in 11 apples —————.
8. 5 dollars are contained in 11 dollars —————.
9. 5 tenths are contained in 11 tenths —————.
10. 5 ninths are contained in 11 ninths —————.

SLATE WORK.

$\frac{3}{4} + \frac{1}{3}$	$\frac{3}{4} - \frac{1}{3}$	$\frac{3}{4} \div \frac{1}{3}$
$\frac{3}{4} = \frac{9}{12}$	$\frac{3}{4} = \frac{9}{12}$	$\frac{3}{4} = \frac{9}{12}$
$\frac{1}{3} = \frac{4}{12}$	$\frac{1}{3} = \frac{4}{12}$	$\frac{1}{3} = \frac{4}{12}$
$\frac{9}{12} + \frac{4}{12} = \frac{13}{12}$	$\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$	$\frac{9}{12} \div \frac{4}{12} = 2\frac{1}{4}$
$\frac{3}{4} + \frac{1}{3} = \frac{13}{12}$	$\frac{3}{4} - \frac{1}{3} = \frac{5}{12}$	$\frac{3}{4} \div \frac{1}{3} = 2\frac{1}{4}$

Using the above as models, require the pupil to solve the following, ***first orally***, afterwards upon slate or paper. Do not hasten over this work. Take all the time that seems necessary to make the pupil perfectly familiar with every step in each process. Give additional problems for oral solution,—none of them more difficult than those here given.

$\frac{2}{3} + \frac{1}{4}$	$\frac{2}{3} - \frac{1}{4}$	$\frac{2}{3} \div \frac{1}{4}$
$\frac{3}{4} + \frac{1}{6}$	$\frac{3}{4} - \frac{1}{6}$	$\frac{3}{4} \div \frac{1}{6}$

1. Find the quotient of $5 \div \frac{2}{3}$.
This means, find how many times ________________.
I can change 5 to thirds. $5 =$ ______ thirds.
2 thirds are contained in 15 thirds ________________.

2 oranges are contained in 15 oranges ________________.
2 quarts are contained in 15 quarts ________________.
2 thirds are contained in 15 thirds ________________.
2 inches are contained in 15 inches ________________.

2. Find the quotient of $3 \div \frac{4}{5}$.
This means, find ________________________________.
I can change 3 to fifths. $3 =$ ______ fifths.
4 fifths are contained in 15 fifths ________________.

3. Find the quotient of $6 \div \frac{3}{4}$.
This means, ____.
I can change ________________. $6 =$ ______ fourths.
3 fourths are contained in 24 fourths ____________.

4. $2 \div \frac{2}{5}$, means, ________________. $2 \div \frac{2}{5} =$
5. $\frac{2}{5} \div 2$, means, ________________. $\frac{2}{5} \div 2 =$

6. $3 \div \frac{2}{3}$, means, ________________. $3 \div \frac{2}{3} =$
7. $\frac{2}{3} \div 3$, means, ________________. $\frac{2}{3} \div 3 =$

8. $3 \div \frac{3}{4}$, means, ________________. $3 \div \frac{3}{4} =$
9. $\frac{3}{4} \div 3$, means, ________________. $\frac{3}{4} \div 3 =$

SLATE WORK.

(See models on page 47.)

$\frac{4}{5} + \frac{1}{2}$ $\frac{4}{5} - \frac{1}{2}$ $\frac{4}{5} \div \frac{1}{2}$
$\frac{5}{6} + \frac{1}{4}$ $\frac{5}{6} - \frac{1}{4}$ $\frac{5}{6} \div \frac{1}{4}$

1. Add $\frac{3}{5}$ and $\frac{1}{2}$.
I can change fifths and halves to ——.
$\frac{3}{5}$ = —— tenths. $\frac{1}{2}$ = —— tenths.
—— tenths and —— tenths are ——.
The sum of $\frac{3}{5}$ and $\frac{1}{2}$ is ————.

2. From $\frac{4}{5}$ subtract $\frac{1}{2}$.
I can change fifths and halves to ——.
$\frac{4}{5}$ = —— tenths. $\frac{1}{2}$ = —— tenths.
—— tenths less —— tenths are —— ——.
The difference of $\frac{4}{5}$ and $\frac{1}{2}$ is ————.

3. Multiply $\frac{4}{5}$ by 3. 3 times $\frac{4}{5}$ is ————.
The product of $\frac{4}{5}$ and 3 is ————.

4. Multiply $10\frac{1}{2}$ by $\frac{1}{2}$. $\frac{1}{2}$ of $10\frac{1}{2}$ is ————.
The product of $10\frac{1}{2}$ and $\frac{1}{2}$ is————.

5. Multiply $\frac{3}{4}$ by $\frac{1}{2}$. $\frac{1}{2}$ of $\frac{3}{4}$ is ————,
The product of $\frac{3}{4}$ and $\frac{1}{2}$ is ————.

6. Multiply 6 by $4\frac{1}{2}$. $4\frac{1}{2}$ times 6 =
The product of 6 and $4\frac{1}{2}$ is ————.

7. Divide $\frac{4}{5}$ by $\frac{1}{2}$.
I can change fifths and halves to ——.
$\frac{4}{5}$ = —— tenths. $\frac{1}{2}$ = —— tenths.
—— tenths are contained in —— tenths ——.
The quotient of $\frac{4}{5}$ divided by $\frac{1}{2}$ is ————.

8. Divide 6 by $\frac{2}{3}$.
I can change 6 to thirds. 6 = —— thirds.
—— thirds are contained in —— thirds ——.
The quotient of 6 divided by $\frac{2}{3}$ is ——.

9. Divide $\frac{4}{5}$ by 2. $\frac{1}{2}$ of $\frac{4}{5}$ =
The quotient of $\frac{4}{5}$ divided by 2 is —— ——.

10. Divide $\frac{3}{5}$ by 2. $\frac{1}{2}$ of $\frac{3}{5}$ =
The quotient of $\frac{3}{5}$ divided by 2 is —— ——.

It will be observed that there are two sets of problems on this page, each of which corresponds to the nine problems on page 49. Require the pupil to solve them, using language similar to that employed on the preceding page.

SET No. 1.

1. $\frac{4}{5} + \frac{1}{2}$ I can change ________________
2. $\frac{1}{2} - \frac{2}{5}$ I can change ________________
3. $\frac{4}{5} \times 4$ 4 times ________________
4. $12\frac{1}{2} \times \frac{1}{3}$ $\frac{1}{3}$ of ________________
5. $\frac{5}{6} \times \frac{1}{2}$ $\frac{1}{2}$ of ________________
6. $8 \times 3\frac{1}{2}$ $3\frac{1}{2}$ times ________________
7. $\frac{1}{2} \div \frac{1}{5}$ I can change ________________
8. $4 \div \frac{2}{3}$ I can change ________________
9. $\frac{3}{4} \div 2$ $\frac{1}{2}$ of ________________

SET No. 2.

10. $\frac{2}{5} + \frac{1}{2}$, means, ________________. I can ________
11. $\frac{1}{2} - \frac{1}{5}$, means, ________________. I can ________
12. $\frac{3}{5} \times 6$, means, ________________. $\frac{3}{5} \times 6 =$
13. $9\frac{1}{2} \times \frac{1}{3}$, means, ________________. $9\frac{1}{2} \times \frac{1}{3} =$
14. $\frac{2}{5} \times \frac{1}{2}$, means, ________________. $\frac{2}{5} \times \frac{1}{2} =$
15. $8 \times 4\frac{1}{2}$, means, ________________. $8 \times 4\frac{1}{2} =$
16. $\frac{1}{2} \div \frac{2}{5}$, means, ________________. I can ________
17. $4 \div \frac{2}{5}$, means, ________________. I can ________
18. $\frac{1}{6} \div 2$, means, ________________. $\frac{1}{6} \div 2 =$

SLATE WORK.

(See models on page 36.)

$10\frac{3}{4} + 6\frac{1}{8}$
$12\frac{1}{6} + 5\frac{1}{4}$
$13\frac{5}{6} + 3\frac{1}{4}$
$16\frac{2}{3} + 2\frac{1}{4}$

$15\frac{3}{4} - 5\frac{1}{8}$
$17\frac{5}{6} - 4\frac{1}{4}$
$18\frac{5}{6} - 5\frac{3}{4}$
$19\frac{2}{3} - 2\frac{1}{4}$

$12\frac{1}{3} \times 4$
$12\frac{1}{3} \times 5$
$12\frac{1}{3} \times 6$
$12\frac{1}{3} \times 7$

1. $\frac{1}{2} + \frac{1}{3}$ I can change ________________.
2. $\frac{1}{2} - \frac{1}{3}$ I can change ________________.
3. $\frac{2}{3} \times 6$ 6 times ________________.
4. $4 \times 6\frac{1}{2}$ $6\frac{1}{2}$ times ________________.
5. $4\frac{1}{2} \times 6$ 6 times ________________.
6. $9 \times \frac{1}{4}$ $\frac{1}{4}$ of ________________.
7. $12\frac{1}{2} \times \frac{1}{4}$ $\frac{1}{4}$ of ________________.
8. $\frac{2}{3} \times \frac{1}{4}$ $\frac{1}{4}$ of ________________.
9. $\frac{1}{2} \div \frac{1}{3}$ I can change ________________.
10. $5 \div \frac{2}{3}$ I can change ________________.
11. $\frac{2}{3} \div 4$ $\frac{1}{4}$ of ________________.

12. $\frac{5}{6} + \frac{1}{4}$, means, ________________. I can ______
13. $\frac{5}{6} - \frac{1}{4}$, means, ________________. I can ______
14. $\frac{5}{6} \times 3$, means, ________________. $\frac{5}{6} \times 3 =$
15. $5 \times 3\frac{1}{2}$, means, ________________. $5 \times 3\frac{1}{2} =$
16. $5\frac{1}{2} \times 3$, means, ________________. $5\frac{1}{2} \times 3 =$
17. $10 \times \frac{2}{3}$, means, ________________. $10 \times \frac{2}{3} =$
18. $15\frac{1}{2} \times \frac{1}{3}$, means, ________________. $15\frac{1}{2} \times \frac{1}{3} =$
19. $\frac{3}{4} \times \frac{1}{3}$, means, ________________. $\frac{3}{4} \times \frac{1}{3} =$
20. $\frac{5}{6} \div \frac{1}{4}$, means, ________________. I can ______
21. $5 \div \frac{3}{4}$, means, ________________. I can ______
22. $\frac{2}{3} \div 3$, means, ________________. $\frac{2}{3} \div 3 =$
23. The teacher divided $\frac{2}{3}$ of a yard of ribbon equally among 3 pupils; each pupil received ______ ______ of a yard.

REVIEW.

(Do not omit.)

$4\frac{1}{2}$ cents × 2. 4 cents × 2 =

4 yards ÷ $\frac{1}{2}$ a yard. $\frac{1}{2}$ a yard ÷ 4 =

This page should be read, *first by column*, then *by line*. The pupil should be required to give the meaning of each expression, especially in columns three, four, and five, before attempting to complete it. For "seat work" the pupil may copy and complete the expressions in these exercises.

EXERCISE 1.

$\frac{1}{2} + \frac{1}{4} =$	$\frac{1}{2} - \frac{1}{4} =$	$\frac{1}{2} \times 6 =$	$6 \div \frac{1}{2} =$	$\frac{1}{2} \div 6 =$
$\frac{1}{2} + \frac{1}{6} =$	$\frac{1}{2} - \frac{1}{6} =$	$\frac{1}{2} \times 5 =$	$5 \div \frac{1}{2} =$	$\frac{1}{2} \div 5 =$
$\frac{1}{2} + \frac{1}{8} =$	$\frac{1}{2} - \frac{1}{8} =$	$\frac{1}{2} \times 4 =$	$4 \div \frac{1}{2} =$	$\frac{1}{2} \div 4 =$
$\frac{1}{2} + \frac{1}{10} =$	$\frac{1}{2} - \frac{1}{10} =$	$\frac{1}{2} \times 3 =$	$3 \div \frac{1}{2} =$	$\frac{1}{2} \div 3 =$
$\frac{1}{2} + \frac{1}{12} =$	$\frac{1}{2} - \frac{1}{12} =$	$\frac{1}{2} \times 2 =$	$2 \div \frac{1}{2} =$	$\frac{1}{2} \div 2 =$

EXERCISE 2.

$\frac{1}{3} + \frac{1}{6} =$	$\frac{1}{3} - \frac{1}{6} =$	$\frac{1}{3} \times 4 =$	$4 \div \frac{1}{3} =$	$\frac{1}{3} \div 4 =$
$\frac{1}{3} + \frac{1}{9} =$	$\frac{1}{3} - \frac{1}{9} =$	$\frac{1}{3} \times 3 =$	$3 \div \frac{1}{3} =$	$\frac{1}{3} \div 3 =$
$\frac{1}{3} + \frac{1}{12} =$	$\frac{1}{3} - \frac{1}{12} =$	$\frac{1}{3} \times 2 =$	$2 \div \frac{1}{3} =$	$\frac{1}{3} \div 2 =$
$\frac{1}{4} + \frac{1}{8} =$	$\frac{1}{4} - \frac{1}{8} =$	$\frac{1}{4} \times 3 =$	$3 \div \frac{1}{4} =$	$\frac{1}{4} \div 3 =$
$\frac{1}{4} + \frac{1}{12} =$	$\frac{1}{4} - \frac{1}{12} =$	$\frac{1}{4} \times 2 =$	$2 \div \frac{1}{4} =$	$\frac{1}{4} \div 2 =$
$\frac{1}{5} + \frac{1}{10} =$	$\frac{1}{5} - \frac{1}{10} =$	$\frac{1}{5} \times 2 =$	$2 \div \frac{1}{5} =$	$\frac{1}{5} \div 2 =$
$\frac{1}{6} + \frac{1}{12} =$	$\frac{1}{6} - \frac{1}{12} =$	$\frac{1}{6} \times 2 =$	$2 \div \frac{1}{6} =$	$\frac{1}{6} \div 2 =$

EXERCISE 3.

In the solution of these problems, sometimes require the pupil to "think aloud." He may say, "$\frac{2}{3}+\frac{1}{6}$. I can change thirds to sixths. $\frac{2}{3}=\frac{4}{6}$. $\frac{4}{6}$ and $\frac{1}{6}$ are $\frac{5}{6}$." Give special attention to the meaning of the expressions in the fourth column. The problems in heavy type may be omitted until the book is reviewed.

$\frac{2}{3} + \frac{1}{6} =$	$\frac{2}{3} - \frac{1}{6} =$	$\frac{2}{3} \times 6 =$	$6 \div \frac{2}{3} =$	**$\frac{2}{3} \div 6 =$**
$\frac{2}{3} + \frac{5}{6} =$	$\frac{5}{6} - \frac{2}{3} =$	$\frac{2}{3} \times 5 =$	$5 \div \frac{2}{3} =$	**$\frac{2}{5} \div 5 =$**
$\frac{2}{3} + \frac{1}{9} =$	$\frac{2}{3} - \frac{1}{9} =$	$\frac{2}{3} \times 4 =$	$4 \div \frac{2}{3} =$	$\frac{2}{3} \div 4 =$
$\frac{2}{3} + \frac{2}{9} =$	$\frac{2}{3} - \frac{2}{9} =$	$\frac{2}{3} \times 3 =$	$3 \div \frac{2}{3} =$	$\frac{2}{3} \div 3 =$
$\frac{2}{3} + \frac{4}{9} =$	$\frac{2}{3} - \frac{4}{9} =$	$\frac{2}{3} \times 2 =$	$2 \div \frac{2}{3} =$	$\frac{2}{3} \div 2 =$
$\frac{2}{3} + \frac{5}{9} =$	$\frac{2}{3} - \frac{5}{9} =$	$\frac{2}{3} \times 1 =$	$1 \div \frac{2}{3} =$	**$\frac{2}{3} \div 7 =$**

The suggestion made in connection with Exercise III. on the preceding page, applies to all the exercises on this page. This caution however is necessary: *Do not require pupils to speak until they think.* At first require pupils simply to give answers to questions. If they are unable to answer a question given or to fill a blank in a statement, *lead up to it by other questions less difficult.* When the pupil can give the correct answer to a problem *then* he may be required to express the thoughts by means of which he obtained the answer. The problems in heavy type may be omitted until the book is reviewed.

EXERCISE 4.

$\frac{3}{4}+\frac{1}{8}=$	$\frac{3}{4}-\frac{1}{8}=$	$\frac{3}{4}\times 6=$	$6\div\frac{3}{4}=$	$\frac{3}{4}\div \mathbf{6}=$
$\frac{3}{4}+\frac{3}{8}=$	$\frac{3}{4}-\frac{3}{8}=$	$\frac{3}{4}\times 5=$	$5\div\frac{3}{4}=$	$\frac{3}{4}\div \mathbf{5}=$
$\frac{3}{4}+\frac{5}{8}=$	$\frac{3}{4}-\frac{5}{8}=$	$\frac{3}{4}\times 4=$	$4\div\frac{3}{4}=$	$\frac{3}{4}\div \mathbf{4}=$
$\frac{3}{4}+\frac{7}{8}=$	$\frac{7}{8}-\frac{3}{4}=$	$\frac{3}{4}\times 3=$	$3\div\frac{3}{4}=$	$\frac{3}{4}\div 3=$
$\frac{3}{4}+\frac{1}{12}=$	$\frac{3}{4}-\frac{1}{12}=$	$\frac{3}{4}\times 2=$	$2\div\frac{3}{4}=$	$\frac{3}{4}\div 2=$

EXERCISE 5.

$\frac{2}{5}+\frac{1}{10}=$	$\frac{2}{5}-\frac{1}{10}=$	$\frac{2}{5}\times 5=$	$5\div\frac{2}{5}=$	$\frac{2}{5}\div \mathbf{5}=$
$\frac{2}{5}+\frac{3}{10}=$	$\frac{2}{5}-\frac{3}{10}=$	$\frac{2}{5}\times 4=$	$4\div\frac{2}{5}=$	$\frac{2}{5}\div \mathbf{4}=$
$\frac{2}{5}+\frac{7}{10}=$	$\frac{7}{10}-\frac{2}{5}=$	$\frac{2}{5}\times 3=$	$3\div\frac{2}{5}=$	$\frac{2}{5}\div \mathbf{3}=$
$\frac{2}{5}+\frac{9}{10}=$	$\frac{9}{10}-\frac{2}{5}=$	$\frac{2}{5}\times 2=$	$2\div\frac{2}{5}=$	$\frac{2}{5}\div 2=$
$\frac{3}{5}+\frac{1}{10}=$	$\frac{3}{5}-\frac{1}{10}=$	$\frac{3}{5}\times 3=$	$3\div\frac{3}{5}=$	$\frac{3}{5}\div 3=$
$\frac{3}{5}+\frac{3}{10}=$	$\frac{3}{5}-\frac{3}{10}=$	$\frac{3}{5}\times 2=$	$2\div\frac{3}{5}=$	$\frac{3}{5}\div 2=$

EXERCISE 6.

$\frac{3}{5}+\frac{7}{10}=$	$\frac{7}{10}-\frac{3}{5}=$	$\frac{3}{5}\times 5=$	$5\div\frac{3}{5}=$	$\frac{3}{5}\div \mathbf{5}=$
$\frac{3}{5}+\frac{9}{10}=$	$\frac{9}{10}-\frac{3}{5}=$	$\frac{3}{5}\times 4=$	$4\div\frac{3}{5}=$	$\frac{3}{5}\div \mathbf{4}=$
$\frac{4}{5}+\frac{1}{10}=$	$\frac{4}{5}-\frac{1}{10}=$	$\frac{4}{5}\times 5=$	$5\div\frac{4}{5}=$	$\frac{4}{5}\div \mathbf{5}=$
$\frac{4}{5}+\frac{3}{10}=$	$\frac{4}{5}-\frac{3}{10}=$	$\frac{4}{5}\times 4=$	$4\div\frac{4}{5}=$	$\frac{4}{5}\div \mathbf{4}=$
$\frac{4}{5}+\frac{7}{10}=$	$\frac{4}{5}-\frac{7}{10}=$	$\frac{4}{5}\times 3=$	$3\div\frac{4}{5}=$	$\frac{4}{5}\div \mathbf{3}=$
$\frac{4}{5}+\frac{9}{10}=$	$\frac{9}{10}-\frac{4}{5}=$	$\frac{4}{5}\times 2=$	$2\div\frac{4}{5}=$	$\frac{4}{5}\div 2=$

See suggestions on pp. 52 and 55. Ask pupils to *tell the meaning* of each expression in the third, fourth, and fifth columns, before completing it.

The problems in heavy type may be omitted until the book is reviewed.

EXERCISE 7.

$\frac{5}{6}+\frac{1}{12}=$	$\frac{5}{6}-\frac{1}{12}=$	$\frac{5}{6}\times 5=$	$5\div\frac{5}{6}$	$\frac{5}{6}\div \mathbf{5}=$
$\frac{5}{6}+\frac{5}{12}=$	$\frac{5}{6}-\frac{5}{12}=$	$\frac{5}{6}\times 4=$	$4\div\frac{5}{6}$	$\frac{5}{6}\div \mathbf{4}=$
$\frac{5}{6}+\frac{7}{12}=$	$\frac{5}{6}-\frac{7}{12}=$	$\frac{5}{6}\times 3=$	$3\div\frac{5}{6}$	$\frac{5}{6}\div \mathbf{3}=$
$\frac{5}{6}+\frac{11}{12}=$	$\frac{11}{12}-\frac{5}{6}=$	$\frac{5}{6}\times 2=$	$2\div\frac{5}{6}$	$\frac{5}{6}\div 2=$

EXERCISE 8.

Take great care that the pupil understands the meaning of such expressions as $6\times\frac{1}{2}$, $\frac{1}{3}\times\frac{1}{2}$, etc. 6×3, means, take 3 sixes; 6×2, means, take 2 sixes; 6×1, means, take 1 six; $6\times\frac{1}{2}$, means. take $\frac{1}{2}$ of 6; $6\times\frac{1}{3}$, means, take $\frac{1}{3}$ of 6.

$\frac{1}{2}+\frac{1}{3}=$	$\frac{1}{2}-\frac{1}{3}=$	$6\times\frac{1}{2}=$	$\frac{1}{3}\times\frac{1}{2}=$	$\frac{1}{2}\div\frac{1}{3}=$
$\frac{1}{2}+\frac{2}{3}=$	$\frac{2}{3}-\frac{1}{2}=$	$5\times\frac{1}{2}=$	$\frac{2}{3}\times\frac{1}{2}=$	$\frac{2}{3}\div\frac{1}{2}=$
$\frac{1}{2}+\frac{1}{5}=$	$\frac{1}{2}-\frac{1}{5}=$	$4\times\frac{1}{2}=$	$\frac{1}{5}\times\frac{1}{2}=$	$\frac{1}{2}\div\frac{1}{5}=$
$\frac{1}{2}+\frac{2}{5}=$	$\frac{1}{2}-\frac{2}{5}=$	$3\times\frac{1}{2}=$	$\frac{2}{5}\times\frac{1}{2}=$	$\frac{1}{2}\div\frac{2}{5}=$
$\frac{1}{2}+\frac{3}{5}=$	$\frac{3}{5}-\frac{1}{2}=$	$2\times\frac{1}{2}=$	$\frac{3}{5}\times\frac{1}{2}=$	$\frac{3}{5}\div\frac{1}{2}=$
$\frac{1}{2}+\frac{4}{5}=$	$\frac{4}{5}-\frac{1}{2}=$	$1\times\frac{1}{2}=$	$\frac{4}{5}\times\frac{1}{2}=$	$\frac{4}{5}\div\frac{1}{2}=$

EXERCISE 9.

$\frac{1}{3}+\frac{1}{4}=$	$\frac{1}{3}-\frac{1}{4}=$	$10\times\frac{1}{3}=$	$\frac{1}{4}\times\frac{1}{3}=$	$\frac{1}{3}\div\frac{1}{4}=$
$\frac{1}{3}+\frac{3}{4}=$	$\frac{3}{4}-\frac{1}{3}=$	$10\times\frac{1}{4}=$	$\frac{2}{3}\times\frac{1}{3}=$	$\frac{3}{4}\div\frac{1}{3}=$
$\frac{2}{3}+\frac{1}{4}=$	$\frac{2}{3}-\frac{1}{4}=$	$10\times\frac{1}{5}=$	$\frac{3}{4}\times\frac{1}{3}=$	$\frac{2}{3}\div\frac{1}{4}=$
$\frac{2}{3}+\frac{3}{4}=$	$\frac{3}{4}-\frac{2}{3}=$	$10\times\frac{1}{6}=$	$\frac{1}{3}\times\frac{1}{4}=$	$\frac{3}{4}\div\frac{2}{3}=$
$\frac{1}{4}+\frac{1}{6}=$	$\frac{1}{4}-\frac{1}{6}=$	$10\times\frac{2}{5}=$	$\frac{1}{2}\times\frac{1}{5}=$	$\frac{1}{4}\div\frac{1}{6}=$
$\frac{1}{4}+\frac{5}{6}=$	$\frac{5}{6}-\frac{1}{4}=$	$10\times\frac{2}{3}=$	$\frac{1}{2}\times\frac{1}{6}=$	$\frac{5}{6}\div\frac{1}{4}=$

Again remind the pupil that there are two "cases" in division. In the first, he is required to find how many times one number is contained in another; in the second, he is required to find a certain part of a number. The latter process is sometimes called partition.

EXERCISE 10.

Addition.	Subtraction.	Multiplication.	Division.	Division.
$24\frac{1}{4}$ $37\frac{1}{2}$	$58\frac{3}{4}$ $26\frac{1}{2}$	$42\frac{1}{6}$ 3	4¢)25¢	2)$36\frac{1}{2}$ bushels
$37\frac{1}{2}$ $46\frac{3}{8}$	$59\frac{7}{8}$ $24\frac{1}{2}$	$53\frac{1}{8}$ 5	\$2)\$49	3)36 $\frac{1}{2}$yards

EXERCISE 11.

$38\frac{1}{3}$ $46\frac{2}{9}$	$55\frac{9}{10}$ $36\frac{1}{2}$	$34\frac{2}{9}$ 4	3¢)64¢	4)$48\frac{1}{2}$ feet
$42\frac{1}{2}$ $38\frac{3}{10}$	$62\frac{11}{12}$ $24\frac{1}{2}$	$26\frac{2}{11}$ 5	\$5)\$56	5)$55\frac{1}{2}$ dollars

EXERCISE 12.

$38\frac{3}{4}$ $42\frac{1}{8}$	$62\frac{3}{4}$ $26\frac{1}{8}$	$35\frac{1}{3}$ 4	3¢)65¢	3)$36\frac{1}{3}$ inches
$45\frac{2}{3}$ $56\frac{1}{6}$	$72\frac{2}{3}$ $28\frac{1}{6}$	$24\frac{1}{2}$ 4	\$4)\$46	4)$48\frac{1}{2}$ bushels

EXERCISE 13.

$72\frac{1}{3}$ $41\frac{1}{12}$	$83\frac{1}{3}$ $47\frac{1}{12}$	$32\frac{1}{3}$ 5	3¢)73¢	5)$65\frac{1}{2}$ dollars
$81\frac{1}{4}$ $24\frac{5}{12}$	$72\frac{3}{4}$ $26\frac{5}{12}$	$34\frac{2}{5}$ 5	\$5)\$68	2)$74\frac{1}{2}$ quarts

EXERCISE 14.

Addition.	Subtraction.	Multiplication.	Division.	Division.
$36\frac{3}{4}$ $41\frac{1}{2}$	65 $22\frac{3}{4}$	$46\frac{3}{5}$ 3	2 pk.)56 pk.	3)46 miles
$75\frac{1}{2}$ $22\frac{5}{8}$	87 $34\frac{2}{5}$	$35\frac{2}{7}$ 5	3 qt.)84 qt.	4)53 qt.

EXERCISE 15.

$54\frac{3}{4}$ $42\frac{3}{8}$	75 $42\frac{5}{7}$	$24\frac{2}{3}$ 4	4 in.)52 in.	2)57 gallons
63 25	48 14	$38\frac{3}{4}$ 2	\$3)\$76	3)46 feet

EXERCISE 16.

$55\frac{3}{4}$ $26\frac{1}{2}$	59 $24\frac{2}{3}$	$42\frac{4}{5}$ 2	4¢)54¢	5)67 yards
$56\frac{1}{2}$ $36\frac{5}{6}$	68 $35\frac{4}{5}$	$37\frac{1}{2}$ 4	\$5)\$72	4)46 inches

EXERCISE 17.

$64\frac{3}{5}$ $28\frac{1}{2}$	76 $24\frac{5}{8}$	$35\frac{5}{8}$ 4	3¢)41¢	5)51 dollars
$46\frac{3}{4}$ $28\frac{2}{3}$	87 $34\frac{5}{9}$	$25\frac{2}{3}$ 5	2 yd.)74 yd.	6)80 pecks
$57\frac{1}{2}$ $36\frac{2}{3}$	$94\frac{1}{2}$ $36\frac{1}{4}$	$34\frac{3}{4}$ 3	4¢)48¢	4)48¢

PART II.

---

6 eights = 48. **4 twelves = 48.**
8 sixes = 48. **12 fours = 48.**

1. Forty-eight is —— sixes. 7 sixes =
2. Forty-eight is —— eights. 5 eights =
3. Forty-eight is —— twelves. 3 twelves =
4. 48 days are 6 weeks and —— days.
5. 48 in. are —— feet. 3 ft. are —— inches.
6. 48 pk. are —— bushels. 9 bush. are —— pk.
7. 48 qt. are —— pecks. 5 pecks are —— qt.
8. 48 eggs are —— dozen eggs. 3 dozen =
9. 48 qt. are —— gallons. 10 gal. are —— qt.
10. 48¢ are —— dimes and —— cents.
11. 48 dimes are —— dollars and —— cents.
12. One fourth of 48 is ——. 10 is $\frac{1}{4}$ of ——.
13. Three fourths of 48 are ——. $\frac{3}{4}$ of 40 =
14. One sixth of 48 is ——. $\frac{2}{6}$ of 48 =
15. One eighth of 48 is ——. $\frac{3}{8}$ of 48 =
16. One twelfth of 48 is ——. $\frac{5}{12}$ of 48 =
17. Twelve is —— —— of 48. $\frac{1}{2}$ of 48 is ——.
18. Eight is —— —— of 48. $\frac{1}{2}$ of 40 is ——.
19. Six is —— —— of 48. $\frac{1}{2}$ of 30 is ——.

SLATE WORK.

7 days)$\underline{\text{91 days}}$ 4 qt.)$\underline{\text{56 qt.}}$ 5)$\underline{\text{95 bushels}}$

Teach the meaning and use of the word fraction.

1. (a) The sum of two numbers is 48; one of the numbers is 40; the other number is ——.

(b) The sum of two fractions is $\frac{3}{4}$; one of the fractions is $\frac{1}{2}$; the other fraction is —— ——.

2. (a) The difference of two numbers is 10; the smaller number is 30; the larger number is ——.

(b) The difference of two fractions is $\frac{1}{8}$; the smaller fraction is $\frac{1}{2}$; the larger fraction is —— ——.

3. (a) The difference of two numbers is 8; the larger number is 48; the smaller number is ——.

(b) The difference of two fractions is $\frac{1}{10}$; the larger fraction is $\frac{1}{2}$; the smaller fraction is —— ——.

4. (a) Mr. Giles earns $4 a day; in 4 days he earns —— dollars; in $4\frac{1}{2}$ days he earns ————————.

(b) Harry Giles earns $\$\frac{1}{2}$ a day, in 4 days he earns —— dollars; in $4\frac{1}{2}$ days he earns ————————.

5. (a) When oranges cost 4¢ each, 48¢ will pay for —— oranges; 36¢ will pay for ————————.

(b) When melons cost $\$\frac{1}{8}$ each, $\$\frac{3}{4}$ will pay for —— melons; $\$\frac{1}{2}$ will pay for ————————.

6. (a) Henry paid 48¢ for 8 pounds of sugar; 1 pound cost —— cents; 3 pounds cost ————————.

(b) William paid $\$\frac{1}{2}$ for 4 pounds of cheese; 1 pound cost ————. 2 pounds cost ————.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$56\frac{1}{3}$	94	24	5 yd.)60 yd.	5)60 yd.
$45\frac{2}{9}$	$46\frac{1}{2}$	$2\frac{1}{3}$		

If the directions and suggestions given on the preceding pages have been carefully followed, it is believed that diagrams will not be necessary in teaching the work found on this page. The pupil should now be able to "*see with the mind's eye*" the circle or the line or the space, divided into sevenths and fourteenths.

1. One half is —— fourteenths.
2. One seventh is —— fourteenths.
3. Two sevenths are —— fourteenths.
4. Five sevenths are —— fourteenths.
5. Three sevenths are —— fourteenths.
6. Four sevenths are —— fourteenths.

7. $\frac{10}{14} = \frac{}{7}$ $\frac{6}{14} = \frac{}{7}$ $\frac{4}{14} = \frac{}{7}$ $\frac{12}{14} = \frac{}{7}$
8. $\frac{8}{14} = \frac{}{7}$ $\frac{2}{14} = \frac{}{7}$ $\frac{7}{14} = -$ $\frac{14}{14} =$

9. 1 half and 1 fourteenth are —— ——.
10. 1 half and 3 fourteenths are —— ——.
11. 1 half less 1 fourteenth are —— ——.
12. 1 half less 3 fourteenths are —— ——.

13. 3 fourteenths and 1 half are —— ——.
14. 5 fourteenths and 1 half are —— ——.
15. 9 fourteenths less 1 half are —— ——.
16. 13 fourteenths less 1 half are —— ——.

17. 1 seventh and 1 fourteenth are —— ——.
18. 1 seventh and 3 fourteenths are —— ——.
19. 2 sevenths less 1 fourteenth are —— ——.
20. 5 sevenths less 1 fourteenth are —— ——.

SLATE WORK.

(See models on page 47.)

$\frac{5}{7} + \frac{1}{2}$ $\frac{5}{7} - \frac{1}{2}$ $\frac{1}{2} \div \frac{1}{7}$

$\frac{1}{2} + \frac{6}{7}$ $\frac{6}{7} - \frac{1}{2}$ $\frac{6}{7} \div \frac{1}{2}$

Use diagrams and teach the meaning and use of the words, rectangle, rectangular, oblong, and square.

□ ▭ Both of these figures are rectangles; the first is a square, the second is an oblong.

1. $2\frac{1}{7}$ miles + $3\frac{1}{14}$ miles =
2. 4 miles − $2\frac{1}{7}$ miles =
3. $\frac{3}{7}$ of a mile × 3 =
4. $2\frac{2}{7}$ miles × 3 = $2\frac{3}{14} \times 3 =$
5. 14 miles × $\frac{3}{7}$ = * $14 \times \frac{5}{7} =$ *
6. $\frac{1}{7}$ mile × $\frac{1}{2}$ = * $14\frac{1}{7} \times \frac{1}{2} =$ *
7. 7 miles × $\frac{1}{7}$ = * $7 \times 2\frac{1}{7} =$ *
8. $\frac{1}{2} \div \frac{1}{7}$ * I can change ——————————.
9. $2 \div \frac{1}{7}$ * I can change ——————————
10. $\frac{3}{7} \div 2$ * $\frac{1}{2}$ of——————————.

11. Mary has a rectangular flower bed; it is 4 feet long and half as wide as it is long; it is —— feet wide. The distance around Mary's flower bed is —— feet.

12. Mary's father has a rectangular farm; it is $\frac{1}{2}$ of a mile long and half as wide as it is long; it is —— of a mile wide. The distance around the farm is —————— miles.

13. A rectangular figure whose sides are equal is called a ————. Jane has a square flower bed; it is three feet across it. The distance around Jane's flower bed is —— feet.

14. Helen has a square picture frame; it is $10\frac{1}{2}$ inches from one corner to the next corner. The distance around the frame is —— inches.

15. Draw two rectangles, making one square, and the other oblong; make each side of the square exactly 1 inch; make the oblong 1 inch by 2 inches.

Tell the meaning of the expression *before completing the statement.

7 sevens = 49. **5 tens = 50.**
10 fives = 50. **2 twenty-fives = 50.**

1. Forty-nine is —— sevens. 6 sevens =
2. Fifty is —— tens. 4 tens =
3. Fifty is —— fives. 9 fives =
4. 49 days are —— weeks. 6 weeks =
5. 49 inches are —— feet and —— inch.
6. 49 eggs are —— dozen and ————.
7. 49 quarts are —— pecks and —— quart.
8. 49 quarts are —— gallons and —— quart.
9. 49 cents are —— dimes and —— cents.
10. 49 dimes are —— dollars and —— cents.

11. One seventh of 49 is ——. 4 is $\frac{1}{7}$ of ——.
12. Two sevenths of 49 are ——. 6 is $\frac{2}{7}$ of ——.
13. Three sevenths of 49 are ——. 6 is $\frac{3}{7}$ of ——.
14. One seventh of 50 is ——. $\frac{1}{7}$ of 51 is ——.

15. 7 is contained in 49 —— times. $49 \div 7 =$
16. 7 is contained in 50 —— and —— —— times.
17. 7 is contained in 51 —— and —— —— times.
18. 7 is contained in 53 —— and —— —— times.

19. The quotient of 50 divided by 5 is ——.
20. The quotient of 51 divided by 5 is ————.
21. The quotient of 52 divided by 5 is ————.
22. The quotient of 53 divided by 5 is ————.

SLATE WORK.

12 inches	15 dozen	26½ bushels
7½	5½	4

1. When the Fourth of July came, George had 49¢; William had only 2¢ more than $\frac{1}{7}$ as much; William had —— cents.

2. At noon, James had spent $\frac{2}{3}$ of the money his father had given him in the morning, and had 10¢ left; his father gave him —— cents; he had spent —— cents.

3. Roy spent $\frac{3}{4}$ of the money he earned picking berries, and had 5¢ left; he earned —— cents; he spent —— cents.

4. Harry spent 12¢; this was $\frac{2}{3}$ of what he earned; he earned —— cents.

5. John (foolish boy) spent 12¢ for fire-crackers; this was $\frac{3}{4}$ of all the money he had; before he bought the crackers he had —— cents; after he bought them he had —— cents.

6. Bennie spent $\frac{3}{4}$ of his money and had 5¢ left; he spent —— cents.

7. Joseph spent $\frac{2}{3}$ of his money and had 7¢ left; he spent —— cents.

8. In the evening, Peter had 10¢; this was $\frac{2}{7}$ as much as he had in the morning; in the morning he had —— cents.

9. Victor had 10¢; one half of Victor's money was equal to one fourth of Eddie's money. Eddie had —— cents.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$68\frac{1}{2}$	86	$54\frac{1}{2}$	6 in.)90 in.	6)90 in.
$44\frac{1}{7}$	$28\frac{1}{7}$	4		

Lead the pupil to perceive that thirds and fifths can be expressed in fifteenths.

1. One third is ——— fifteenths. $\frac{2}{3} = \frac{}{15}$.
2. One fifth is ——— fifteenths. $\frac{2}{5} = \frac{}{15}$.
3. 4 fifths are ——— fifteenths. $\frac{3}{5} = \frac{}{15}$.

4. $\frac{5}{15} = \frac{}{3}$ $\frac{10}{15} = \frac{}{3}$ $\frac{3}{15} = \frac{}{5}$ $\frac{6}{15} = \frac{}{5}$
5. $\frac{9}{15} = \frac{}{5}$ $\frac{12}{15} = \frac{}{5}$ $\frac{15}{15} =$ $1\frac{1}{5} = \frac{}{5}$

6. 1 third and 1 fifteenth are —————.
7. 1 third and 2 fifteenths are —————.
8. 1 third less 1 fifteenth are —————.
9. 2 thirds less 1 fifteenth are —————.
10. 2 thirds and 1 fifteenth are —————.
11. 2 thirds and 2 fifteenths are —————.

12. 1 fifth and 1 fifteenth are —————.
13. 1 fifth and 2 fifteenths are —————.
14. 1 fifth less 1 fifteenth are —————.
15. 2 fifths less 1 fifteenth are —————.
16. 2 fifths and 1 fifteenth are —————.
17. 3 fifths and 2 fifteenths are —————.

18. 4 fifteenths and 1 third are —————.
19. 4 fifteenths and 1 fifth are —————.
20. 5 fifteenths less 1 fifth are —————.
21. 7 fifteenths less 1 fifth are —————.
22. 9 fifteenths less 1 fifth are —————.
23. 12 fifteenths and 1 fifth are —————.

SLATE WORK.

(See models on page 47).

$\frac{2}{3} + \frac{1}{5}$ $\frac{2}{3} - \frac{1}{5}$ $\frac{2}{3} \div \frac{1}{5}$

$\frac{4}{5} + \frac{1}{3}$ $\frac{4}{5} - \frac{1}{3}$ $\frac{4}{5} \div \frac{1}{3}$

1. $3\frac{1}{5}$ months and $2\frac{1}{15}$ months =
2. 6 months − $1\frac{2}{5}$ months =
3. $\frac{2}{5}$ of a month × 2 =
4. $8\frac{2}{5}$ months × 2 = $8\frac{2}{15} \times 2 =$
5. 15 dollars × $\frac{3}{5}$ = * $10 \times \frac{2}{5} =$ *
6. $\frac{1}{5}$ dollar × $\frac{1}{2}$ = * $\frac{1}{5} \times \frac{1}{3} =$ *
7. $\frac{2}{3} + \frac{2}{15}$ *   I can change ——————
8. $2\frac{1}{5} \div \frac{1}{5}$ *   I can change ——————
9. $\frac{2}{5} \div 3$ * $\frac{1}{3}$ of ——————

10. When eggs are 10¢ a dozen, for 50¢ I can buy —— dozen; for 45¢ I can buy —— dozen.

11. James Brown earns $7 a week; in 2 weeks he earns —— dollars; in $2\frac{1}{2}$ weeks he earns —— dollars; in $2\frac{1}{3}$ weeks he earns —— dollars.

12. The teacher drew a rectangular figure on the blackboard; the figure was 12 inches long and $\frac{1}{3}$ as wide as it was long; it was —— inches wide; the distance around it was —— inches.

13. A strong boy can saw $\frac{1}{2}$ a cord of wood in a day; in 4 days he can saw —— cords; in 7 days he can saw ——————.

14. When a peck of beans is worth $\frac{1}{2}$ of a dollar, a bushel of beans is worth —— dollars.

15. $\frac{2}{5}$ of 10 are ——.
10 is $\frac{2}{5}$ of ——.

16. $\frac{2}{7}$ of 14 are ——.
14 is $\frac{2}{7}$ of ——.

17. $\frac{3}{7}$ of 14 are ——.
9 is $\frac{3}{7}$ of ——.

18. $\frac{5}{7}$ of 21 are ——.
20 is $\frac{5}{7}$ of ——.

*Tell the meaning of the expression *before completing the statement.*

6 nines = 54. **9 sixes = 54.**

1. Fifty-four is —— nines. 5 nines =
2. Fifty-four is —— sixes. 8 sixes =
3. 54 is 6 eights and ——. 5 eights =
4. 54 is 7 sevens and ——. 6 sevens =
5. 54 days are —— weeks and —— days.
6. 54 inches are —— feet and —— inches.
7. 54 quarts are —— pecks and —— quarts.

8. One ninth of 54 is ——. 3 is $\frac{1}{9}$ of ——.
9. Two ninths of 54 are ——. 6 is $\frac{2}{9}$ of ——.
10. One sixth of 54 is ——. 5 is $\frac{1}{6}$ of ——.
11. Five sixths of 54 are ——. 10 is $\frac{5}{6}$ of ——.

12. 6 is contained in 54 —— times. 54 ÷ 6 =
13. 6 is contained in 55 —— and —— —— times.
14. 6 is contained in 56 —— and —— —— times.
15. 9 is contained in 54 —— times. 54 ÷ 9 =
16. 9 is contained in 55 —— and —— —— times.
17. 9 is contained in 56 —— and —— —— times.

18. The quotient of 54 divided by 9 is ——————.
19. The quotient of 55 divided by 9 is ——————.
20. The quotient of 56 divided by 9 is ——————.
21. The quotient of 57 divided by 9 is ——————.
22. The quotient of 58 divided by 9 is ——————.
23. The quotient of 55 divided by 6 is ——————.
24. The quotient of 56 divided by 6 is ——————.

SLATE WORK.

36 bushels	37 dollars	$37\frac{1}{3}$ dollars
$5\frac{1}{3}$	$5\frac{1}{3}$	3

1. James Barker works 6 days each week and earns $9.

In $\frac{1}{2}$ of a week he earns ——— dollars.
In $\frac{1}{3}$ of a week he earns ——— dollars.
In $\frac{2}{3}$ of a week he earns ——— dollars.
In 3 days he earns ——— dollars.
In 2 days he earns ——— dollars.
In 1 day he earns ——— dollars.
In 4 days he earns ——— dollars.
In 5 days he earns ——— dollars.

2. Henry Simmons earned $5 in 2 days; at the same rate, in 1 day he would earn ————————dollars; in 3 days he would earn ————————————.

3. Jimmie Green earns $$\frac{3}{4}$ a day; in 2 days he earns ————————; in 3 days he earns ————————.

4. Peter Piper worked from Monday morning until the next Saturday evening; he received $$\frac{3}{4}$ of a dollar a day; he paid $$\frac{1}{2}$ a day for his board, and put the remainder in the bank; when Saturday night came he had put into the bank ————————————.

5. Frank earns $8 in 4 days; at the same rate, in 5 days he would earn ————————————.

6. William earns $$\frac{1}{4}$ an hour; in one day of 9 hours he earns ————————————.

7. Henry earns $$\frac{3}{4}$ in 2 hours; at the same rate, in 3 hours, he would earn ————————————.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$46\frac{3}{7}$	94	$38\frac{2}{3}$	4·pk.)64 pk.	4)64 pk.
$28\frac{1}{2}$	$39\frac{2}{5}$	3		

Lead the pupil to perceive that fourths and eighths can be expressed in sixteenths.

1. One fourth is —— sixteenths. $\frac{1}{2} = \frac{}{16}$
2. Three fourths are —— sixteenths. $\frac{2}{4} = \frac{}{16}$
3. One eighth is —— sixteenths. $\frac{3}{8} = \frac{}{16}$
4. Five eighths are —— sixteenths. $\frac{7}{8} = \frac{}{16}$

5. $\frac{2}{16} = \frac{}{8}$ $\frac{4}{16} = -$ $\frac{6}{16} = \frac{}{8}$ $\frac{8}{16} =$
6. $\frac{10}{16} = \frac{}{8}$ $\frac{12}{16} = -$ $\frac{14}{16} = \frac{}{8}$ $\frac{17}{16} =$

7. Three fourths and 1 sixteenth are —— ——.
8. Three fourths less 1 sixteenth are —— ——.
9. Three fourths and 3 sixteenths are —— ——.
10. Three fourths less 3 sixteenths are —— ——.

11. Three sixteenths and 1 half are —— ——.
12. Three sixteenths and 1 fourth are —— ——.
13. Three sixteenths and 1 eighth are —— ——.

14. Three eighths and 1 sixteenth are —— ——.
15. Three eighths less 1 sixteenth are —— ——.
16. Three eighths and 3 sixteenths are —— ——.
17. Three eighths less 3 sixteenths are —— ——.

18. $\frac{1}{2} + \frac{1}{16} =$ $\frac{1}{2} - \frac{1}{16} =$ $\frac{1}{2} \div \frac{1}{16} =$
19. $\frac{1}{8} + \frac{1}{16} =$ $\frac{1}{8} - \frac{1}{16} =$ $\frac{1}{8} \div \frac{1}{16} =$
20. $\frac{1}{4} + \frac{1}{16} =$ $\frac{1}{4} - \frac{1}{16} =$ $\frac{1}{4} \div \frac{1}{16} =$

SLATE WORK.

(See models on page 47.)

$\frac{3}{5} + \frac{1}{3}$ $\frac{3}{5} - \frac{1}{3}$ $\frac{3}{5} \div \frac{1}{3}$

$\frac{4}{7} + \frac{1}{2}$ $\frac{4}{7} - \frac{1}{2}$ $\frac{1}{2} \div \frac{2}{7}$

1. $4\frac{1}{4}$ bush. + $3\frac{1}{16}$ bush. =
2. 8 bush. − $1\frac{5}{8}$ bush. =
3. $\frac{5}{16}$ of a bush. × 2 =
4. $4\frac{5}{16}$ bush. × 2 = $7\frac{3}{16} \times 2 =$
5. 12 bush. × $\frac{3}{4}$ = * $12 \times \frac{1}{5} =$ *
6. $\frac{1}{2}$ bush. × $\frac{1}{4}$ = * $\frac{1}{8} \times \frac{1}{2} =$ *
7. $\frac{3}{4} \div \frac{5}{16}$ * I can change ——————.
8. $6 \div \frac{3}{4}$ * I can change ——————
9. $\frac{3}{8} \div 2$ * $\frac{1}{2}$ of ——————

10. When corn is 40¢ a bushel, 3 pecks cost —— cents.

11. Mary's chickens eat a quart of corn in 3 days; in 7 days they eat ——————.

12. Mr. Jones's horses eat $\frac{1}{2}$ a bushel of oats each day and his lambs eat a peck each day; in 4 days the horses and lambs together eat —— bushels.

13. Samuel had $2\frac{1}{2}$ bushels of wheat in a bag; he took out $1\frac{1}{8}$ bushels; there remained in the bag —— bushels.

14. Teddie had $1\frac{1}{8}$ bushels of hickory nuts; his sister Emma had $1\frac{1}{16}$ bushels; together they had —— bushels.

15. $\frac{3}{8}$ of 32 are ——.
  6 is $\frac{3}{8}$ of ——.

16. $\frac{7}{8}$ of 32 are ——.
  14 is $\frac{7}{8}$ of ——.

17. $\frac{5}{6}$ of 18 are ——.
  10 is $\frac{5}{6}$ of ——.

18. $\frac{3}{4}$ of 24 are ——
  18 is $\frac{3}{4}$ of ——.

19. $\frac{3}{5}$ of 15 are ——.
  15 is $\frac{3}{5}$ of ——.

20. $\frac{2}{5}$ of 10 are ——.
  10 is $\frac{2}{5}$ of ——.

21. $\frac{3}{7}$ of 21 are ——.
  21 is $\frac{3}{7}$ of ——.

22. $\frac{3}{4}$ of 16 are ——.
  16 is $\frac{4}{5}$ of ——.

---

* **Tell the meaning of the expression *before* completing the statement.**

In preparation for the reading of this page, if possible, use balances, requiring the pupil to estimate the weight of many objects and afterwards to weigh them. Teach the abbreviations oz. and lb.

16 ounces = 1 lb.

1. 1 lb. = —— ounces. $\frac{1}{2}$ lb. = —— ounces.
2. $\frac{1}{4}$ lb. = —— ounces. $\frac{3}{4}$ lb. = —— ounces.
3. $\frac{1}{8}$ lb. = —— ounces. $\frac{3}{8}$ lb. = —— ounces.
4. $\frac{5}{8}$ lb. = —— ounces. $\frac{7}{8}$ lb. = —— ounces.

5. One ounce is —— —— of a pound.
6. Two ounces are —— —— of a pound.*
7. Three ounces are —— —— of a pound.
8. Four ounces are —— —— of a pound.*
9. Five ounces are —— —— of a pound.
10. Six ounces are —— —— of a pound.*
11. Seven ounces are —— —— of a pound.
12. Eight ounces are —— —— of a pound.*
13. Nine ounces are —— —— of a pound.
14. Ten ounces are —— —— of a pound.*
15. Eleven ounces are —— —— of a pound.
16. Twelve ounces are —— —— of a pound.*
17. Thirteen ounces are —— —— of a pound.
18. Fourteen ounces are —— —— of a pound.*
19. Fifteen ounces are —— —— of a pound.

20. $1\frac{1}{4}$ lb. = —— oz. $1\frac{1}{8}$ lb. = —— oz.
21. $1\frac{1}{2}$ lb. = —— oz. $1\frac{3}{8}$ lb. = —— oz.
22. 20 oz. = —— lb. 24 oz. = —— lb.
23. 18 oz. = —— lb. 19 oz. = —— lb.
24. 17 oz. = —— lb. 21 oz. = —— lb.
25. $1\frac{5}{8}$ lb. = —— oz. $1\frac{7}{8}$ lb. = —— oz.

***Pupils should read each statement marked with a (*), twice, first giving the fraction in sixteenths, then in its lowest terms.**

1. When cheese costs 16¢ a pound,—
1 ounce costs —— cent.
2 ounces cost —— cents.
5 ounces cost —— cents.
$\frac{1}{2}$ pound costs —— cents.
$\frac{1}{4}$ pound costs —— cents.
$\frac{3}{4}$ pound costs —— cents.

2. John bought 1 lb. and 5 oz. cheese at 16¢ a pound; the cheese cost —— cents; he gave the grocer $\frac{1}{4}$ of a dollar and received in change —— cents.

3. Mary bought 1 lb. and 2 oz. maple sugar at 16¢ a a pound; the sugar cost —— cents; she gave the grocer 2 dimes and received in change —— cents.

4. Helen bought 2 lb. and 8 oz. California grapes at 10¢ a pound; the grapes cost —— cents; she gave the salesman 3 dimes and received in change —— cents.

5. Alice was "playing store."; she had 1 lb. and 8 oz. hickory nuts; she sold $\frac{1}{4}$ of a pound and then had ————————.

6. Alice sold hickory nuts at 8¢ a pound; for 4 oz. she should receive —— cents.

7. One half of 1 lb. and 2 oz. is —— ounces.
8. One half of 2 lb. and 2 oz. is ————————.
9. Two times 2 lb. and 2 oz. are ————————.
10. Two times 2 lb. and 8 oz. are ————————.
11. Two ounces are contained in 1 pound —— times.
12. Four ounces are contained in 1 pound —— times.
13. Eight ounces are contained in 1 pound —— times.
14. Eight ounces are contained in 2 pounds —— times.
15. Four ounces are contained in 2 pounds —— times.
16. Two ounces are contained in 2 pounds —— times.

2 sixteens = 32. **3 sixteens = 48.**
7 eights = 56. **8 sevens = 56.**

1. Fifty-six is —— eights. 6 eights =
2. Fifty-six is —— sevens. 7 sevens =
3. 56 is 6 nines and ——. 5 nines =
4. 56 is 9 sixes and ——. 8 sixes =
5. 57 days are —— weeks and —— day.
6. 57 inches are —— feet and —— inches.
7. 58 quarts are —— pecks and —— quarts.

8. 2 sixteens are ——. 3 sixteens =
9. 2 lb. are —— ounces. 3 lb. = —— oz.
10. $2\frac{1}{2}$ lb. are —— ounces. $3\frac{1}{4}$ lb. = —— oz.
11. $2\frac{1}{4}$ lb. are —— ounces. $3\frac{1}{2}$ lb. = —— oz.
12. $2\frac{1}{8}$ lb. are —— ounces. $3\frac{1}{8}$ lb. = —— oz.

13. 33 ounces are —— pounds and —— ——.
14. 49 ounces are —— pounds and —— ——.
15. 34 ounces are —— pounds and —— ——.
16. 50 ounces are —— pounds and —— ——.

17. One seventh of 56 is ——. 5 is $\frac{1}{7}$ of ——.
18. Two sevenths of 56 are ——. 8 is $\frac{2}{7}$ of ——.
19. One eighth of 56 is ——. 4 is $\frac{1}{8}$ of ——.
20. Two eighths of 56 are ——. 6 is $\frac{2}{8}$ of ——.

21. The quotient of 57 divided by 8 is ————.
22. The quotient of 58 divided by 8 is ————.
23. The quotient of 57 divided by 7 is ————.
24. The quotient of 58 divided by 7 is ————.

SLATE WORK.

7 days)86 days 8 qt.)97 qt. 8)97 qt.

Thirty days hath September, April, June, and November;
All the rest have thirty-one, excepting February alone.

1. In January there are —— weeks and —— days.*
2. In March there are —— weeks and —— days.
3. In April there are —— weeks and —— days.
4. In May there are —— weeks and —— days.
5. In June there are —— weeks and —— days.
6. In July there are —— weeks and —— days.
7. In August there are —— weeks and —— days.
8. In September there are —— weeks and —— days.
9. In October there are —— weeks and —— days.
10. In November there are —— weeks and —— days.
11. In December there are —— weeks and —— days.
12. In February of this year there are ————————. *

13. From January 1 to January 2, it is —— day.
14. From January 1 to January 3, it is —— days.
15. From January 1 to January 5, it is —— days.
16. From February 2 to February 8, it is —— days.
17. From March 10 to March 21, it is —— days.
18. From April 6 to April 26, it is —— days.
19. From May 4 to May 30, it is —— days.
20. From June 1 to June 15, it is —— weeks.
21. From June 11 to June 18, it is —— days.
22. From April 8 to April 12, it is —— days.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$45\frac{3}{7}$	$56\frac{5}{7}$	36	5 lb.)75 lb.	5)75 lb.
$44\frac{5}{7}$	$28\frac{2}{7}$	$3\frac{1}{3}$		

---

*TO THE PUPIL.—Can you read the first 12 statements on this page in 40 seconds?

Lead the pupil to perceive that thirds, sixths, and ninths can be expressed in eighteenths.

1. One third is —— eighteenths.
2. Two thirds are —— eighteenths. $\frac{1}{2} = \frac{}{18}$
3. One sixth is —— eighteenths. $\frac{5}{6} = \frac{}{18}$
4. One ninth is —— eighteenths. $\frac{2}{9} = \frac{}{18}$
5. Four ninths are —— eighteenths. $\frac{5}{9} = \frac{}{18}$
6. Seven ninths are —— eighteenths. $\frac{8}{9} = \frac{}{18}$

7. $\frac{2}{18} = \frac{}{9}$ $\frac{3}{18} = -$ $\frac{4}{18} = -$ $\frac{6}{18} = \frac{}{3}$
8. $\frac{8}{18} = \frac{}{9}$ $\frac{9}{18} = -$ $\frac{10}{18} = -$ $\frac{12}{18} = \frac{}{3}$

9. Five eighteenths and 1 half are ——.
10. Five eighteenths and 1 third are ——.
11. Five eighteenths and 1 sixth are ——.
12. Five eighteenths less 1 sixth are ——.
13. Five eighteenths and 1 ninth are ——.
14. Five eighteenths less 1 ninth are ——.
15. Five eighteenths and 2 ninths are ——.
16. Seven eighteenths less 2 ninths are ——.
17. Seven eighteenths and 2 ninths are ——.
18. Eleven eighteenths less 3 ninths are ——.

19. $\frac{1}{2} + \frac{1}{18} =$ $\frac{1}{2} - \frac{1}{18} =$ $\frac{1}{2} \div \frac{1}{18} =$
20. $\frac{1}{3} + \frac{1}{18} =$ $\frac{1}{3} - \frac{1}{18} =$ $\frac{1}{3} \div \frac{1}{18} =$
21. $\frac{1}{6} + \frac{1}{18} =$ $\frac{1}{6} - \frac{1}{18} =$ $\frac{1}{6} \div \frac{1}{18} =$
22. $\frac{1}{9} + \frac{1}{18} =$ $\frac{1}{9} - \frac{1}{18} =$ $\frac{1}{9} \div \frac{1}{18} =$

SLATE WORK.

(See models on page 47.)

$\frac{7}{9} + \frac{1}{2}$ $\frac{7}{9} - \frac{1}{2}$ $\frac{8}{9} \div \frac{1}{2}$

$\frac{1}{3} + \frac{8}{9}$ $\frac{1}{3} - \frac{2}{9}$ $\frac{1}{3} \div \frac{1}{9}$

1. $5\frac{1}{4}$ lb. $+ 4\frac{1}{8}$ lb. $=$
2. $6\frac{1}{2}$ lb. $- 3\frac{1}{4}$ lb. $=$
3. $\frac{7}{16}$ lb. $\times 2 =$ $2\frac{7}{16}$ lb. $\times 2 =$
4. 8 lb. $\times \frac{3}{4} =$ * 8 lb. $\times 1\frac{3}{4} =$ *
5. $\frac{1}{2}$ lb. $\times \frac{1}{4} =$ * $\frac{1}{2}$ lb. $\times 1\frac{1}{4} =$ *
6. $\frac{5}{6} \div \frac{1}{18}$ * I can change ——————
7. $2 \div \frac{2}{9}$ * I can change ——————
8. $\frac{2}{9} \div 2$ * $\frac{1}{2}$ of ——————

9. I had $4\frac{1}{2}$ bars of soap; each full bar weighed $\frac{1}{2}$ lb.; I had —— pounds. $\frac{1}{2}$ lb. $\times 4\frac{1}{2} =$ *

10. At $\$\frac{1}{2}$ a pound, $6\frac{1}{2}$ lb. of tea would cost —— dollars. $\$\frac{1}{2} \times 6\frac{1}{2} =$ *

11. Alfred bought 3 lb. and 8 oz. of broken candy at 10¢ a pound; the candy cost —— cents; he gave the salesman $\$\frac{1}{2}$ and received in change —— cents.

12. One pound and four ounces of cheese at 16¢ a pound, would cost —— cents.

13. When candy is 10¢ a pound, with 25¢ I can buy —— pounds and —— ounces.

14. Mark worked from noon of January 10th till noon of January 16th for $\$1\frac{1}{2}$ a day; he received —— dollars.

15. From the morning of April 6th to the morning of April 16th it is —— week and —— days.

16. One week and 3 days later than April 15th is April ——th.

17. One week and three days earlier than April 20th is April ——th.

18. Twenty days are —— weeks and —— days.

*Tell the meaning of the expression *before completing the statement.*

6 tens = 60.
5 twelves = 60.

10 sixes = 60.
12 fives = 60.

1. Sixty is —— twelves. 4 twelves =
2. Sixty is —— fives. 9 fives =
3. Sixty is —— tens. 5 tens =
4. Sixty is —— sixes. 9 sixes =
5. 60 is 6 nines and ——. 5 nines =
6. 60 is 7 eights and ——. 6 eights =
7. 60 is 8 sevens and ——. 7 sevens =
8. 60 inches are —— feet. 4 feet =
9. 60 quarts are —— pecks and —— quarts.
10. 60 ounces are —— pounds and —— ounces.

11. One fifth of 60 is ——. 8 is $\frac{1}{5}$ of ——.
12. Two fifths of 60 are ——. 8 is $\frac{2}{5}$ of ——.
13. Three fifths of 60 are ——. 9 is $\frac{3}{5}$ of ——.
14. Four fifths of 60 are ——. 16 is $\frac{4}{5}$ of ——.
15. One tenth of 60 is ——. 5 is $\frac{1}{10}$ of ——.
16. One sixth of 60 is ——. 4 is $\frac{1}{6}$ of ——.
17. One twelfth of 60 is ——. 3 is $\frac{1}{12}$ of ——.

18. $5\frac{1}{2}$ ft. are —— inches. $5\frac{1}{4}$ ft. =
19. $5\frac{1}{3}$ ft. are —— inches. $5\frac{1}{6}$ ft. =
20. $4\frac{1}{2}$ ft. are —— inches. $4\frac{1}{4}$ ft. =
21. $4\frac{1}{3}$ ft. are —— inches. $4\frac{1}{6}$ ft. =
22. 5 is contained in 61 —— and —— —— times.
23. 5 is contained in 62 —— and —— —— times.
24. 6 is contained in 61 —— and —— —— times.
25. 6 is contained in 62 —— and —— —— times.

SLATE WORK.

2 pt.)247 pt.   3 ft.)56 ft.   3)56 ft.

Teach the pupil to add by sevens from 1 to 29, thus; 1, 8, 15, 22, 29; from 2 to 30; from 3 to 31; from 4 to 25; from 5 to 26; from 6 to 27.

1. If the first Sunday in January is the first day of January, the second Sunday is the ——th; the third Sunday is the ——th; the fourth Sunday is the ——; the fifth Sunday is the ——.

2. If the first Sunday in December is the third day of December, the second Sunday is the ——th; the third Sunday is the ——; the fourth Sunday is the ——; the fifth Sunday is the ——.

3. The first Sunday of this month was the —— day of the month; the second Sunday ——————; the third Sunday ——————; the fourth Sunday ——————; the fifth Sunday ——————.

4. The first day of January, 1894, was Monday;
January 8th was ——; January 9th was ——;
January 15th was ——; January 14th was ——;
January 22nd was ——; January 23rd was ——;
January 29th was ——; January 28th was ——;
January 30th was ——; January 16th was ——;

5. From January 1st to January 10th it is —— week and —— days.

6. From January 1st to January 17th it is —— weeks and —— days. From January 10th to January 19th it is —— week and —— days.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$36\frac{5}{8}$	$59\frac{3}{4}$	$57\frac{1}{3}$	4 oz.)64 oz.	4)64 oz.
$47\frac{3}{4}$	$26\frac{5}{8}$	4		

To the pupil.—Can you read numbers 1 to 6 inclusive, in four minutes?

Lead the pupil to perceive that fourths, fifths, and tenths, can be expressed in twentieths.

1. One fourth is —— twentieths.
2. Three fourths are —— twentieths.
3. One fifth is —— twentieths.
4. Three fourths are —— twentieths.
5. One tenth is —— twentieths.
6. Seven tenths are —— twentieths.

$\frac{1}{2} = \frac{}{20}$
$\frac{2}{5} = \frac{}{20}$
$\frac{4}{5} = \frac{}{20}$
$\frac{3}{10} = \frac{}{20}$
$\frac{9}{10} = \frac{}{20}$

7. $\frac{2}{20} = \frac{}{10}$ $\quad \frac{4}{20} = \frac{}{5}$ $\quad \frac{6}{20} = -$ $\quad \frac{8}{20} = -$
8. $\frac{10}{20} = -$ $\quad \frac{12}{20} = -$ $\quad \frac{14}{20} = -$ $\quad \frac{16}{20} = -$

9. Seven twentieths and 1 tenth are ————.
10. Seven twentieths less 1 tenth are ————.
11. Seven twentieths and 1 fifth are ————.
12. Seven twentieths less 1 fifth are ————.

13. Three fourths and 1 twentieth are ————.
14. Three fourths less 1 twentieth are ————.
15. Three fourths and 3 twentieths are ————.
16. Three fourths less 3 twentieths are ————.
17. One half and 1 twentieth are ————.
18. One half less 1 twentieth are ————.

19. $\frac{1}{2} + \frac{1}{20} =$ $\quad \frac{1}{2} - \frac{1}{20} =$ $\quad \frac{1}{2} \div \frac{1}{20} =$
20. $\frac{1}{4} + \frac{1}{20} =$ $\quad \frac{1}{4} - \frac{1}{20} =$ $\quad \frac{1}{4} \div \frac{1}{20} =$
21. $\frac{1}{5} + \frac{1}{20} =$ $\quad \frac{1}{5} - \frac{1}{20} =$ $\quad \frac{1}{5} \div \frac{1}{20} =$
22. $\frac{1}{10} + \frac{1}{20} =$ $\quad \frac{1}{10} - \frac{1}{20} =$ $\quad \frac{1}{10} \div \frac{1}{20} =$

SLATE WORK.

(See models on page 47

$\frac{1}{4} + \frac{1}{5}$ $\quad \frac{3}{4} - \frac{1}{2}$ $\quad \frac{4}{5} \div \frac{1}{4}$
$\frac{2}{5} + \frac{1}{4}$ $\quad \frac{2}{5} - \frac{1}{4}$ $\quad \frac{3}{4} \div \frac{1}{5}$

1. $6\frac{1}{2}$ ft. + $3\frac{1}{12}$ ft. =
2. $7\frac{1}{2}$ ft. − $2\frac{1}{12}$ ft. =
3. $\frac{5}{12}$ ft. × 2 = $3\frac{1}{12}$ ft. × 2 =
4. 10 ft. × $\frac{2}{5}$ = *   10 ft. × $1\frac{2}{5}$ = *
5. $\frac{1}{4}$ ft. × $\frac{1}{3}$ = * $\frac{1}{4}$ ft. × $2\frac{1}{3}$ = *
6. $\frac{3}{4} \div \frac{1}{16}$ *   I can change ————————
7. $2 \div \frac{1}{12}$ *   I can change ————————
8. $\frac{3}{4} \div 5$ * $\frac{1}{5}$ of ————————————

9. Sarah has a rectangular flower bed $1\frac{1}{2}$ feet wide; it is twice as long as it is wide; it is —— feet long; the distance around it is —— feet.

10. Bessie has a square flower bed; it is 17 ft. around it; one side is —— feet. $\frac{1}{4}$ of 17 ft. is ——. 17 ft. ÷ 4 =

11. Timothy can saw 5 cords of wood in 4 days; in one day he can saw —— cords. $\frac{1}{4}$ of 5 cords is ——. 5 cords ÷ 4 = *

12. Charlie James earns $3 a day; in $4\frac{1}{2}$ days he earns ———————— dollars. $3 × $4\frac{1}{2}$ = *

13. At \$$\frac{1}{5}$ of a dollar a pound $3\frac{1}{2}$ pounds of coffee cost ————————. \$$\frac{1}{5}$ × $3\frac{1}{2}$ = *

14. At 20¢ a pound, 1 lb. and 4 oz. of cheese costs —— cents; 1 lb. and 8 oz. costs ————.

15. $\frac{3}{5}$ of 15 are ——.   15 is $\frac{3}{5}$ of ——.
16. 12 is —— —— of 18.   12 is —— —— of 16.
17. $\frac{2}{3}$ of 15 are ——.   15 is $\frac{2}{3}$ of ——.
18. 15 is —— —— of 20.   14 is —— —— of 21.
19. 10 is —— —— of 15.   5 is —— —— of 15.
20. 14 is —— —— of 16.   2 is —— —— of 16.
21. 5 is —— —— of 25.   20 is —— —— of 25.

*Tell the meaning of the expression *before completing the statement*.

7 nines = 63. **9 sevens = 63.**

1. Sixty-three is —— nines. 6 nines =
2. Sixty-three is —— sevens. 8 sevens =
3. 63 is 7 eights and ——. 6 eights =
4. 63 is —— tens and ——. 5 tens =
5. 63 inches are —— feet and —— inches.
6. 63 inches are —— and —— —— feet.
7. 63 quarts are —— pecks and —— quarts.
8. 63 quarts are —— and —— —— pecks.
9. 63 ounces are 3 pounds and —— ounces.
10. 63 ounces are —— and —— —— pounds.

11. One seventh of 63 is ——. 6 is $\frac{1}{7}$ of ——.
12. Two sevenths of 63 are ——. 6 is $\frac{2}{7}$ of ——.
13. Three sevenths of 63 are ——. 6 is $\frac{3}{7}$ of ——.
14. One ninth of 63 is ——. 6 is $\frac{1}{9}$ of ——.
15. Two ninths of 63 are ——. 6 is $\frac{2}{9}$ of ——.
16. Three ninths of 63 are ——. 6 is $\frac{3}{9}$ of ——.

17. The quotient of 63 divided by 9 is ——.
18. The quotient of 64 divided by 9 is ————.
19. The quotient of 65 divided by 9 is ————.

20. 7 is contained in 63 —— times.
21. 7 is contained in 64 —— and —— —— times.
22. 7 is contained in 65 —— and —— —— times.
23. 9 is contained in 64 —— and —— —— times.
24. 9 is contained in 65 —— and —— —— times.

SLATE WORK.

42 feet	24 dollars	36½ dollars
6½	6½	6

Review pp. 38, 69, and 95, of Second Grade Work.

FOR DRILL.

Read rapidly (1) by column downwards, (2) by column upwards, and (3) by line. Continue this drill until each pupil can read the table by line *in two minutes or less.*

6 times 2 are ——.	6 tens are ——.
6 times 3 are ——.	6 nines are ——.
6 times 4 are ——.	6 eights are ——.
6 times 5 are ——.	6 sevens are ——.
6 times 6 are ——.	6 sixes are ——.
6 times 7 are ——.	7 fives are ——.
6 times 8 are ——.	6 fives are ——.
6 times 9 are ——.	8 fours are ——.
6 times 10 are ——.	7 fives are ——.
7 times 2 are ——.	6 fours are ——.
7 times 3 are ——.	9 threes are ——.
7 times 4 are ——.	8 threes are ——.
7 times 5 are ——.	7 threes are ——.
8 times 2 are ——.	6 threes are ——.
8 times 3 are ——.	9 twos are ——.
8 times 4 are ——.	8 twos are ——.
9 times 2 are ——.	7 twos are ——.
9 times 3 are ——.	6 twos are ——.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$56\frac{7}{12}$ $47\frac{1}{2}$	$65\frac{9}{10}$ $32\frac{2}{5}$	$35\frac{1}{4}$ 6	7 days)95 days	7)95 days
$\frac{3}{4}$ $\frac{2}{5}$	$\frac{3}{4}$ $\frac{2}{5}$	$\frac{3}{4}$ 6	$\frac{1}{8})\frac{3}{4}$	$2)\frac{3}{4}$

Lead the pupil to perceive that elevenths can be expressed in twenty-seconds.

1. One eleventh is —— twenty-seconds.
2. Two elevenths are —— twenty-seconds.
3. Five elevenths are —— twenty-seconds.
4. Three elevenths are —— twenty-seconds.
5. One half is —— twenty-seconds.

6. $\frac{2}{22} = \frac{}{11}$ $\frac{4}{22} = —$ $\frac{6}{22} = —$ $\frac{11}{22} = —$

7. 7 twenty-seconds and 1 eleventh are ————.
8. 7 twenty-seconds less 1 eleventh are ————.
9. 7 twenty-seconds and 2 elevenths are ————.
10. 7 twenty-seconds less 2 elevenths are ————.
11. 9 twenty-seconds and 1 eleventh are ————.
12. 9 twenty-seconds less 1 eleventh are ————.
13. 9 twenty-seconds and 2 elevenths are ————.
14. 9 twenty-seconds less 2 elevenths are ————.
15. 9 twenty-seconds and 3 elevenths are ————.

16. $\frac{1}{2} + \frac{1}{22} =$ $\frac{1}{2} - \frac{1}{22} =$ $\frac{1}{2} \div \frac{1}{22} =$
17. $\frac{1}{11} + \frac{1}{22} =$ $\frac{1}{11} - \frac{1}{22} =$ $\frac{1}{11} \div \frac{1}{22} =$
18. $\frac{1}{2} + \frac{3}{22} =$ $\frac{1}{2} - \frac{3}{22} =$ $\frac{1}{2} \div \frac{3}{22} =$
19. $\frac{13}{22} + \frac{1}{11} =$ $\frac{13}{22} - \frac{1}{11} =$ $\frac{13}{22} \div \frac{1}{11} =$

SLATE WORK.

(See models on page 47.)

$\frac{1}{2} + \frac{1}{11}$ $\frac{1}{2} - \frac{1}{11}$ $\frac{1}{2} \div \frac{1}{11}$

$\frac{10}{11} + \frac{1}{2}$ $\frac{10}{11} - \frac{1}{2}$ $\frac{10}{11} \div \frac{1}{2}$

$\frac{4}{5} + \frac{1}{4}$* $\frac{4}{5} - \frac{1}{4}$* $\frac{4}{5} \div \frac{1}{4}$*

$\frac{8}{9} + \frac{1}{2}$ $\frac{8}{9} - \frac{1}{2}$ $\frac{1}{2} \div \frac{2}{9}$

$\frac{5}{7} + \frac{1}{2}$ $\frac{5}{7} - \frac{1}{2}$ $\frac{6}{7} \div \frac{1}{14}$

*Require the pupil (a) to tell the meaning of the expression, (b) to complete the statement, and (c) to tell the suggested number story.

1. $5\frac{1}{2}$ qt. + $4\frac{3}{4}$ qt. =
2. 6 qt. − $2\frac{3}{4}$ qt. =
3. $\frac{2}{3}$ qt. × 2 = $2\frac{2}{3}$ qt. × 2 =
4. 9 qt. × $\frac{2}{3}$ = * 9 qt. × $2\frac{2}{3}$ = *
5. $\frac{1}{2}$ qt. × $\frac{1}{4}$ = * $\frac{1}{2}$ qt. × $4\frac{1}{4}$ = *
6. $\frac{3}{5} \div \frac{1}{15}$ * I can change ——————
7. $2 \div \frac{2}{15}$ * I can change ——————
8. $\frac{3}{5} \div 3$ * $\frac{1}{3}$ of ——————

9. (a) A shepherd had 6 lambs in pen No. 1; these were $\frac{1}{5}$ as many as he had in pen No. 2; in pen No. 2 there were —— lambs; in both pens there were —— lambs.

(b) In pen No. 3 there were 8 lambs; these were $\frac{2}{5}$ as many as there were in pen No. 4; in pen No. 4 there were —— lambs.

(c) In pen No. 5 there were 12 lambs; these were $\frac{3}{4}$ as many as there were in pen No. 6; in pen No. 6 there were —— lambs.

(d) Take your pencil and find how many lambs there were in all the pens.

10. Six of a farmer's cows were in the barn and all the others in a pasture; those in the barn were $\frac{1}{4}$ of all the cows he had; in the pasture there were —— cows; the farmer owned —— cows.

11. Mary had 12 chickens in a coop; these were $\frac{2}{5}$ of all she had; outside the coop there were —— chickens; all together she had —— chickens.

12. Fourteen is $\frac{2}{5}$ of what number?

*Tell the meaning of the expression *before* completing the statement.

10 sevens = 70. 7 tens = 70.
8 eights = 64.

1. Sixty-four is —— eights.
2. Seventy is —— sevens.
3. 64 is 7 nines and ——.
4. 64 is 9 sevens and ——.
5. 64 is 10 sixes and ——.
6. 70 is 7 nines and ——.
7. 70 is 8 eights and ——.

7 eights =
9 sevens =
6 nines =
8 sevens =
9 sixes =
5 nines =
6 eights =

8. One eighth of 64 is ——.
9. Three eighths of 64 are ——.
10. Five eighths of 64 are ——.
11. One tenth of 70 is ——.
12. Three tenths of 70 are ——.
13. Seven tenths of 70 are ——.

5 is $\frac{1}{8}$ of ——.
6 is $\frac{3}{8}$ of ——.
15 is $\frac{5}{8}$ of ——.
4 is $\frac{1}{10}$ of ——.
9 is $\frac{3}{10}$ of ——.
14 is $\frac{7}{10}$ of ——.

14. The quotient of 64 divided by 8 is ————.
15. The quotient of 65 divided by 8 is ————.
16. The quotient of 66 divided by 8 is ————.

17. 8 is contained in 64 —— times.
18. 8 is contained in 65 —— and —— —— times.
19. 8 is contained in 66 —— and —— —— times.
20. 7 is contained in 71 —— and —— —— times.
21. 7 is contained in 72 —— and —— —— times.

SLATE WORK.

75 dollars	75½ dollars	54 dollars
6½	6	6⅓
$6)75 dollars	6)75 dollars	2)72½ dollars

1. (a) The sum of two numbers is 32; one of the numbers is 12; the other number is ——.

(b) The sum of two fractions is $\frac{7}{8}$; one of the fractions is $\frac{1}{2}$; the other fraction is ——.

2. (a) The difference of two numbers is 11; the smaller number is 16; the larger number is ——.

(b) The difference of two fractions is $\frac{5}{12}$; the smaller fraction is $\frac{1}{2}$; the larger fraction is ——.

(c) The difference of two numbers is $4\frac{1}{2}$; the smaller number is $6\frac{1}{12}$; the larger number is ——.

3. William lives $7\frac{3}{4}$ miles north of Waukegan and Benjamin lives $4\frac{1}{8}$ miles south of Waukegan; from William's home to Benjamin's home it is —— miles.

4. Henry lives $8\frac{2}{5}$ miles east of Aurora and Samuel lives $4\frac{1}{10}$ miles east of Aurora; from Henry's home to Samuel's home it is —— miles.

5. Alice lives $5\frac{1}{5}$ miles north of Aurora and Sarah lives $3\frac{1}{2}$ miles north of Alice's home; from Aurora to Sarah's home it is —— miles.

6. James spent $\frac{3}{5}$ of his money and had 10¢ left; he spent —— cents.

7. January 2, 1894, was Tuesday; January 10th was ——————; January 8th was ——————.

8. February 10, 1894, was Saturday; February 18th was ————; February 20th was ————.

SLATE WORK.

Add.	**Subtract.**	**Multiply.**	**Divide.**	**Divide.**
$54\frac{3}{14}$	$65\frac{11}{14}$	$75\frac{2}{5}$	6 miles)50 miles	6)50 miles
$26\frac{1}{7}$	$28\frac{1}{7}$	6		

Lead the pupil to perceive that halves, thirds, fourths, sixths, eighths, and twelfths, can be expressed in twenty-fourths.

1. One half is —— twenty-fourths.
2. One third is —— twenty-fourths.
3. Two thirds are —— twenty-fourths.
4. One fourth is —— twenty-fourths.
5. Three fourths are —— twenty-fourths.
6. One sixth is —— twenty-fourths.
7. Five sixths are —— twenty-fourths.
8. One eighth is —— twenty-fourths.
9. Three eighths are —— twenty-fourths.
10. Five eighths are —— twenty-fourths.
11. Seven eighths are —— twenty-fourths.
12. One twelfth is —— twenty-fourths.
13. Five twelfths are —— twenty-fourths.
14. Seven twelfths are —— twenty-fourths.
15. Eleven twelfths are —— twenty-fourths.

16. $\frac{2}{24} = \frac{}{12}$ $\frac{3}{24} = \frac{}{8}$ $\frac{4}{24} = -$ $\frac{6}{24} = -$
17. $\frac{8}{24} = -$ $\frac{9}{24} = -$ $\frac{10}{24} = -$ $\frac{12}{24} = -$
18. $\frac{14}{24} = -$ $\frac{15}{24} = -$ $\frac{16}{24} = -$ $\frac{18}{15} = -$
19. $\frac{20}{24} = -$ $\frac{21}{24} = -$ $\frac{22}{24} = -$ $\frac{24}{24} =$

20. $\frac{1}{2} + \frac{1}{24}$ $\frac{1}{2} - \frac{1}{24}$ $\frac{1}{2} \div \frac{1}{24}$
21. $\frac{1}{3} + \frac{1}{24}$ $\frac{1}{3} - \frac{1}{24}$ $\frac{1}{3} \div \frac{1}{24}$
22. $\frac{1}{4} + \frac{1}{24}$ $\frac{1}{4} - \frac{1}{24}$ $\frac{1}{4} \div \frac{1}{24}$
23. $\frac{1}{6} + \frac{1}{24}$ $\frac{1}{6} - \frac{1}{24}$ $\frac{1}{6} \div \frac{1}{24}$
24. $\frac{1}{8} + \frac{1}{24}$ $\frac{1}{8} - \frac{1}{24}$ $\frac{1}{8} \div \frac{1}{24}$
25. $\frac{1}{12} + \frac{1}{24}$ $\frac{1}{12} - \frac{1}{24}$ $\frac{1}{12} \div \frac{1}{24}$

26. Twenty-five twenty-fourths are ————————.
27. Twenty-six twenty-fourths are ————————.

1. $6\frac{1}{2}$ inches + $4\frac{5}{8}$ inches =
2. $8\frac{1}{2}$ inches − $4\frac{1}{8}$ inches =
3. $\frac{3}{4}$ inch × 2 = $2\frac{3}{4}$ inches × 2 =
4. 9 inches × $\frac{1}{4}$ = *   9 in. × $2\frac{1}{4}$ = *
5. $\frac{1}{4}$ inch × $\frac{1}{4}$ = * $\frac{1}{4}$ in. × $4\frac{1}{4}$ = *
6. $\frac{3}{4} \div \frac{1}{16}$ *   I can change ——————
7. $2 \div \frac{3}{8}$ *   I can change ——————
8. $\frac{3}{8} \div 2$ * $\frac{1}{2}$ of ——————

9. At $\frac{1}{5}$ of a dollar a yard, $5\frac{1}{2}$ yards of ribbon costs —— dollars. $\$\frac{1}{5} \times 5\frac{1}{2}$ = *

10. I paid $\$\frac{3}{5}$ for 2 lb. coffee; one pound cost —— —— of a dollar. $\$\frac{3}{5} \div 2$ = *

11. When apples cost $\$\frac{3}{5}$ a bushel, for \$2 I can buy —— bushels. $\$2 \div \$\frac{3}{5}$ = *

12. At 12¢ a pound, 8 oz. of cheese costs —— cents; 4 oz. costs —— cents.

13. (a) A boy walks $2\frac{1}{2}$ miles an hour; in 6 hours he walks —— miles. $2\frac{1}{2}$ miles × 6 = *

(b) The boy can walk 5 miles in —— hours. 5 miles ÷ $2\frac{1}{2}$ miles = *

14. At $\$\frac{1}{5}$ a peck, 2 bushels of potatoes cost —— dollars. $\$\frac{1}{5} \times 8$ = *

SLATE WORK.

(See models on page 47.)

$\frac{1}{3} + \frac{1}{8}$	$\frac{1}{3} - \frac{1}{8}$	$\frac{1}{3} \div \frac{1}{8}$
$\frac{7}{8} + \frac{1}{3}$	$\frac{7}{8} - \frac{1}{3}$	$\frac{7}{8} \div \frac{1}{3}$
$\frac{5}{8} + \frac{1}{3}$	$\frac{5}{8} - \frac{1}{3}$	$\frac{5}{8} \div \frac{1}{3}$
$\frac{2}{3} + \frac{1}{8}$	$\frac{2}{3} - \frac{1}{8}$	$\frac{2}{3} \div \frac{1}{8}$

---

* Tell the meaning of the expression *before completing the statement.*

8 nines = 72. **9 eights = 72.**
6 twelves = 72. **12 sixes = 72.**

1. Seventy-two is —— nines. 7 nines =
2. Seventy-two is —— eights. 8 eights =
3. Seventy-two is —— twelves. 5 twelves =
4. Seventy-two is —— sixes. 10 sixes =
5. 72 is 10 sevens and ——. 9 sevens =
6. 72 inches are —— feet. 4 feet =
7. 72 quarts are —— pecks. 7 pecks =

8. 73 inches are —— feet and —— inch.
9. 73 inches are —— and —— —— feet.
10. 73 quarts are —— pecks and —— quart.
11. 73 quarts are —— and —— —— pecks.
12. 73 cents are —— dimes and —— cents.
13. 73 cents are —— and —— —— dimes.

14. One eighth of 72 is ——. 4 is $\frac{1}{8}$ of ——.
15. Three eighths of 72 are ——. 12 is $\frac{3}{8}$ of ——.
16. One ninth of 72 is ——. 4 is $\frac{1}{9}$ of ——.
17. Two ninths of 72 are ——. 4 is $\frac{2}{9}$ of ——.

18. The quotient of 73 divided by 12 is ——.
19. 6 is contained in 73 —— and —— —— times.
20. 6 is contained in 74 —— and —— —— times.
21. 9 is contained in 74 —— and —— —— times.

SLATE WORK.

84 feet $84\frac{1}{3}$ feet   85
$3\frac{1}{3}$ 3 $3\frac{1}{3}$

3 feet)81 feet   3)81 feet   3)$81\frac{1}{3}$ feet

In problems like the second on this page, it is believed that the teacher will not need to ask, "*What is the cost of one orange?*" but rather, hold the attention of the pupil to the problem until he *knows* the cost of one orange and can fill the blank. See SUGGESTIONS TO TEACHERS, pages 3 and 4.

1. The first Sunday of February, 1894, was the 4th day of the month; the second Sunday was the ——th; the third Sunday was the ——th; the fourth Sunday was the ——th.

2. Frank paid 12¢ for 3 oranges; at the same rate 5 oranges would cost —— cents.

3. Peter paid $\$\frac{1}{2}$ for 2 melons; at the same rate 5 melons would cost —— dollars.

4. James paid 8¢ for 4 oz. chocolate creams; at the same rate 1 pound would cost —— cents.

5. Bessie paid 3¢ for a pint of milk; at the same rate a gallon would cost —— cents.

6. Kate paid 10¢ for $\frac{1}{2}$ of a yard of lace; at the same rate $1\frac{1}{2}$ yards would cost —— cents.

7. Lester gave 2 dimes for a peck of corn; at the same rate a bushel would cost —— ——.

8. Alfred paid 5¢ for 4 peaches; at the same rate a dozen would cost —— cents.

9. Hattie paid 24¢ for a yard of ribbon; at the same rate a piece two feet long would cost —— cents.

10. At 2¢ a foot, 3 yards of rope would cost —— cents.

11. Three times $\frac{1}{2}$ of 12¢ are —— cents.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$76\frac{5}{16}$	$83\frac{1}{2}$	$83\frac{2}{3}$	3 dimes)49 dimes	3)49 dimes
$34\frac{1}{2}$	$27\frac{5}{16}$	6		

Teach the meaning and use of the words numerator and denominator.

The teacher said, "Write three fourths on the blackboard."

John wrote, *three fourths*. Henry wrote, *3 fourths*. Samuel wrote, *three 4ths*. Joseph wrote, *3 4ths*. William wrote, $\frac{3}{4}$.

Who was right, John or Henry or Samuel or Joseph or William?

"The figure 3," said the teacher pointing to what William had written, "is called the *numerator* of the fraction and the figure 4, the *denominator* of the fraction."

The numerator of a fraction I have in mind, is 7; the denominator is 8; the fraction is —— ——.

The denominator of a fraction stands for the name of the parts. In the fraction $\frac{7}{8}$ the denominator 8 stands for the word *eighths*.

The numerator of a fraction tells the number of parts. In the fraction $\frac{7}{8}$ there are 7 parts, each of which is called an ——.

I must think of the numerator as the number that tells how many things we are talking about, and of the denominator as the number that tells what the things are. When I write $\frac{3}{4}$, I mean *3 fourths*, that is, 3 things each of which is called a fourth.

Which is the larger, $\frac{1}{4}$ or $\frac{1}{8}$? $\frac{1}{3}$ or $\frac{1}{6}$? $\frac{3}{4}$ are —— times as much as $\frac{3}{8}$. Why?

Assist the pupil to a conception of that for which the word acre stands.

1. $7\frac{1}{4}$ yards $+ 2\frac{7}{8}$ yards $=$
2. $9\frac{3}{4}$ yards $- 4\frac{1}{8}$ yards $=$
3. $\frac{5}{8}$ yards $\times 2 =$ $3\frac{5}{8}$ yards $\times 2 =$
4. 9 yards $\times \frac{2}{3} =$ * 9 yd. $\times 2\frac{2}{3} =$ *
5. $\frac{1}{4}$ yard $\times \frac{1}{2} =$ * $\frac{1}{4}$ yd. $\times 2\frac{1}{2} =$ *
6. $\frac{2}{9} \div \frac{1}{18}$ * I can change ______
7. $5 \div \frac{3}{4}$ * I can change ______
8. $\frac{5}{7} \div 2$ * $\frac{1}{2}$ of ______

9. The lot upon which this school building stands is ______ ______ of an acre; one half of it is ______ ______ of an acre; a lot twice as large would contain ______.

10. Mr. Johnson's lot was $\frac{1}{2}$ of an acre; he sold $\frac{1}{3}$ of the lot; he sold ______ ______ of an acre; he had ______ ______ of an acre left.

11. A man owned $\frac{3}{4}$ of a mill; he sold $\frac{1}{3}$ of his share; he then owned ______ ______ of the mill.

12. The numerator of a fraction I have in mind is 5; the denominator is 2 times 5 and 1 more; the fraction is ______ ______.

13. January 4th, 1894, was Thursday; January 11th was ______; January 10th was ______.

SLATE WORK.

(See models on page 47.)

$\frac{2}{3} + \frac{3}{8}$ $\frac{2}{3} - \frac{3}{8}$ $\frac{2}{3} \div \frac{3}{8}$
$\frac{2}{3} + \frac{5}{8}$ $\frac{2}{3} - \frac{5}{8}$ $\frac{2}{3} \div \frac{5}{8}$
$\frac{7}{8} + \frac{2}{3}$ $\frac{7}{8} - \frac{2}{3}$ $\frac{7}{8} \div \frac{2}{3}$

Tell the meaning of the expression *before completing the statement.

8 tens = 80. 10 eights = 80.
9 nines = 81.

1. Eighty is —— eights. 9 eights =
2. Eighty-one is —— nines. 8 nines =
3. 81 is —— tens and ——. 7 tens =

4. 80 inches are —— feet and —— inches.
5. 80 inches are —— and —— —— feet.
6. 81 quarts are ——pecks and —— quart.
7. 81 quarts are —— and —— —— pecks.
8. 81 cents are —— dimes and —— cent.
9. 81 cents are —— and —— —— dimes.
10. 81 dimes are —— dollars and —— dime.
11. 81 dimes are —— and —— —— dollars.

12. One ninth of 81 is ——. 3 is $\frac{1}{9}$ of ——.
13. Two ninths of 81 are ——. 8 is $\frac{2}{9}$ of ——.
14. Four ninths of 81 are ——. 8 is $\frac{4}{9}$ of ——.
15. One tenth of 80 is ——. 3 is $\frac{1}{10}$ of ——.
16. Three tenths of 80 are ——. 6 is $\frac{3}{10}$ of ——.
17. Seven tenths of 80 are ——. 21 is $\frac{7}{10}$ of ——.

18. The quotient of 81 divided by 10 is ——.
19. 9 is contained in 82 —— and —— —— times.
20. 9 is contained in 83 —— and —— —— times.
21. 9 is contained in 84 —— and —— —— times.

SLATE WORK.

$$\begin{array}{r} 75 \text{ yards} \\ \underline{4\frac{1}{4} \qquad\quad} \end{array} \qquad \begin{array}{r} 76\frac{1}{4} \text{ yards} \\ \underline{4 \qquad\qquad} \end{array} \qquad \begin{array}{r} 77 \text{ yards} \\ \underline{4\frac{1}{4} \qquad\quad} \end{array}$$

$$4 \text{ yd.}\overline{)52 \text{ yards}} \qquad 4\overline{)52 \text{ yards}} \qquad 4\overline{)52\frac{1}{2} \text{ yards}}$$

See suggestions on page 88.

1. Arthur spent $\frac{3}{4}$ of his money and had 9¢ left; he spent ——— cents.

2. Edward earned 10¢; this was $\frac{2}{5}$ as much as James earned; James earned ——— cents.

3. Howard's slate cost 20¢ and his tablet $\frac{2}{5}$ as much; his tablet cost ——— cents.

4. Mary spent 12¢; this was $\frac{3}{4}$ of what she earned; she earned ——— cents.

5. Sarah paid 4¢ for a quart of milk; at the same rate $1\frac{1}{2}$ gallons would cost ——— cents.

6. John paid 10¢ for 2 quarts of hickory nuts; at the same rate 1 peck would cost ——— cents.

7. Fred Harris earned $8 in 4 days; at the same rate, in 6 days he would earn ——— dollars.

8. William paid $$\frac{1}{4}$ for 1 peck of potatoes; at the same rate, 2 bushels would cost ——— dollars.

9. James earned $5 in 2 days; at the same rate, in 3 days he would earn ——————— dollars.

10. Helen paid 12¢ for 8 eggs; at the same rate, 1 dozen eggs would cost ——— cents.

11. February 1st, 1894, was Thursday; February 8th was ———; February 15th was ———; February 23rd was ———.

12. From February 2nd to February 17th it is ——— days; 15 days are ——— weeks and ——— day.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$83\frac{3}{9}$ $26\frac{1}{18}$	$74\frac{3}{4}$ $18\frac{1}{16}$	$75\frac{3}{5}$ 6	3¢)64¢	3)64¢

After the pupil has read this page, it may be necessary to call his attention again to such diagrams as will make it very clear that the fraction $\frac{12}{24}$ is equal to $\frac{1}{2}$. There must be no "juggling with figures,"—no using of symbols that signify nothing to the pupil.

1. Remember that in this fraction, $\frac{1}{2}$, the figure 2 stands for the word *half;* in this, $\frac{2}{3}$, the figure 3 stands for the word *thirds;* in this, $\frac{3}{4}$, the figure 4 stands for the word ——; in this, $\frac{2}{5}$, the figure 5 stands for the word ——, etc.

2. When the number that is the denominator of a fraction is twice as large as the number that is the numerator, the fraction is one half, or it is equal to —— ——. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$, etc.

3. When the number that is the denominator of a fraction is three times as large as the number that is the numerator, the fraction is —— ——, or it is equal to —— ——. $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$, etc.

*4. When the number that is the denominator of a fraction is —— times as large as the number that is the numerator, the fraction is —— ——, or it is equal to —— ——.

5. When the numerator and the denominator are alike the fraction is equal to ——.

6. $\frac{12}{24} = \frac{1}{\quad}$ $\frac{6}{24} = \frac{1}{\quad}$ $\frac{8}{24} = \frac{1}{\quad}$ $\frac{4}{24} = \frac{1}{\quad}$

7. $\frac{2}{24} = \frac{1}{\quad}$ $\frac{11}{22} = \frac{1}{\quad}$ $\frac{10}{20} = \frac{1}{\quad}$ $\frac{5}{20} = \frac{1}{\quad}$

8. $\frac{4}{20} = \frac{1}{\quad}$ $\frac{2}{20} = \frac{1}{\quad}$ $\frac{9}{18} = \frac{1}{\quad}$ $\frac{6}{18} = \frac{1}{\quad}$

9. $\frac{3}{18} = \frac{1}{\quad}$ $\frac{2}{18} = \frac{1}{\quad}$ $\frac{8}{16} = \frac{1}{\quad}$ $\frac{4}{16} = \frac{1}{\quad}$

10. $\frac{2}{16} = \frac{1}{\quad}$ $\frac{7}{14} = \frac{1}{\quad}$ $\frac{6}{12} = \frac{1}{\quad}$ $\frac{4}{12} = \frac{1}{\quad}$

11. $\frac{3}{12} = \frac{1}{\quad}$ $\frac{2}{12} = \frac{1}{\quad}$ $\frac{5}{10} = \frac{1}{\quad}$ $\frac{4}{8} = \frac{1}{\quad}$

12. $\frac{2}{8} = \frac{1}{\quad}$ $\frac{3}{6} = \frac{1}{\quad}$ $\frac{2}{6} = \frac{1}{\quad}$ $\frac{2}{4} = \frac{1}{\quad}$

---

* **TO THE PUPIL.—Read this statement several times, each time putting a different number in the place of the first blank.**

1. $5\frac{3}{4}$ acres + $3\frac{3}{8}$ acres =
2. $7\frac{3}{10}$ acres − $2\frac{1}{5}$ acres =
3. $2\frac{6}{10}$ acres × 2 = $2\frac{6}{10}$ acres × 3 =
4. 12 acres × $\frac{2}{3}$ = *   12 acres × $2\frac{2}{3}$ = *
5. $\frac{1}{5}$ acre × $\frac{1}{2}$ = * $\frac{1}{5}$ acre × $2\frac{1}{2}$ = *
6. $\frac{3}{10} \div \frac{1}{20}$ *   I can change ————————
7. $4 \div \frac{2}{5}$ *   I can change ————————
8. $\frac{6}{7} \div 2$ * $\frac{1}{2}$ of ————————

9. Mr. Williams owned $\frac{3}{4}$ of an acre of land; he sold $\frac{1}{8}$ of an acre; he then had —— —— of an acre.

10. Mr. Jones had 4 acres of land; he sold 2 lots, each of which contained $\frac{2}{5}$ of an acre; he then had ————.

11. From 6, take 2 times $\frac{2}{5}$.

12. The number that is the denominator of the fraction I have in mind, is five times as large as the number that is the numerator; the fraction is —— —— or it is equal to —— ——.

13. In January there are —— weeks and —— days; so the first day of February is four weeks and three days later than the first day of January. If the first day of January is Monday, the first day of February is ——.

14. To-day is the —— day of ——; one week from to-day will be the —— day of ——.

SLATE WORK.

$\frac{7}{8} + \frac{5}{24} =$ $\frac{7}{8} - \frac{5}{24} =$ $\frac{7}{8} \div \frac{5}{24} =$

$\frac{5}{8} + \frac{1}{24} =$ $\frac{5}{8} - \frac{1}{24} =$ $\frac{5}{8} \div \frac{1}{24} =$

$\frac{7}{24} + \frac{1}{8} =$ $\frac{7}{24} - \frac{1}{8} =$ $\frac{7}{24} \div \frac{1}{8} =$

---

*Tell the meaning of the expression *before completing the statement.*

9 tens = 90. 10 nines = 90.
7 twelves = 84.

1. Ninety is —— tens. 8 tens =
2. Ninety is —— nines. 9 nines =
3. Eighty-four is —— twelves. 6 twelves =
4. 84 is —— tens and ——. 6 tens =
5. 84 is —— nines and ——. 8 nines =
6. 84 is —— eights and ——. 9 eights =

7. 84 inches are —— feet. 6 feet =
8. 84 quarts are —— pecks and —— quarts.
9. 84 quarts are —— and —— —— pecks.
10. 84 cents are —— dimes and —— cents.
11. 84 cents are —— and —— —— dimes.
12. 90 inches are —— feet and —— inches.
13. 90 inches are —— and —— —— feet.

14. One seventh of 84 is ——. 8 is $\frac{1}{7}$ of ——.
15. Two sevenths of 84 are ——. 12 is $\frac{2}{7}$ of ——.
16. One ninth of 90 is ——. 4 is $\frac{1}{9}$ of ——.
17. Two ninths of 90 are ——. 12 is $\frac{2}{9}$ of ——.
18. One tenth of 90 is ——. 4 is $\frac{1}{10}$ of ——.
19. Two tenths of 90 are ——. 12 is $\frac{2}{10}$ of ——.
20. 9 is contained in 91 —— and —— —— times.
21. 9 is contained in 92 —— and —— —— times.

SLATE WORK.

$$\begin{array}{r}82\text{ acres}\\ \underline{4\tfrac{1}{5}\qquad}\end{array}\qquad\begin{array}{r}82\tfrac{1}{5}\text{ acres}\\ \underline{4\qquad\quad}\end{array}\qquad\begin{array}{r}83\text{ acres}\\ \underline{4\tfrac{1}{5}\qquad}\end{array}$$

$$4\text{ acres})\underline{56\text{ acres}}\qquad 4)\underline{56\text{ acres}}\qquad 4)\underline{56\tfrac{1}{3}\text{ acres}}$$

1. A large family consumed a peck of potatoes in 4 days; at that rate a bushel would last them —— days.

2. If 3 oranges cost 6¢, 4 oranges would cost —— cents.

3. If 3 yards of ribbon cost 18¢, $\frac{1}{2}$ of a yard would cost —— cents.

4. If 2 pounds of sugar are worth 12¢, 5 pounds are worth —— cents.

5. If 1 gallon of milk is worth 16¢, one pint is worth —— cents.

6. If the first day of the month is Tuesday, the tenth day of the same month is ——.

7. If John's book cost 25¢ and his slate $\frac{2}{5}$ as much as his book, his book and slate together cost —— cents.

8. If lemons cost 24¢ a dozen, 3 lemons cost —— cents.

9. At 3¢ a pint, one gallon of milk costs —— cents.

10. At 10¢ a quart, one half of a peck of nuts costs —— cents.

SLATE WORK.

Add.	Subtract.	Multiply.	Divide.	Divide.
$136\frac{1}{2}$ $245\frac{1}{4}$	$294\frac{1}{2}$ $146\frac{1}{3}$	$135\frac{1}{2}$ 6	2¢)437¢	2)437¢
$245\frac{1}{3}$ $146\frac{1}{2}$	$372\frac{1}{3}$ $146\frac{1}{4}$	$256\frac{1}{3}$ 3	\$3)\$535	3)\$535
$374\frac{1}{5}$ $275\frac{1}{2}$	$368\frac{4}{5}$ $142\frac{2}{5}$	$375\frac{2}{3}$ 2	2 lb.)275 lb.	2)275 lb.

Teach the meaning and use of the word reduce; also of the expressions, 3rds, 4ths, 5ths, etc.

1. Reduce 6 pints to quarts. 6 pints are —— quarts.
2. Reduce 6 quarts to pints. 6 qt. are —— pints.
3. Reduce 8 quarts to gallons. 8 qt. are —— gal.
4. Reduce 8 gallons to quarts. 8 gal. are —— quarts.
5. Reduce 2 ft. 2 inches to inches. 2 ft. 2 inches are —— inches. 2 ft. 6 in. are —— inches.
6. Reduce 3 pk. 2 qt. to quarts. 3 pk. 2 qt. are —— quarts. 1 pk. 5 qt. are —— quarts.
7. Reduce 25 inches to feet. 25 inches are —— and —— —— feet.
8. Reduce 17 pints to quarts. 17 pints are —— and —— —— quarts.
9. Reduce $\frac{8}{12}$ to thirds. $\frac{8}{12} = \frac{}{3}$
10. Reduce $\frac{2}{3}$ to eighteenths. $\frac{2}{3} = \frac{}{18}$
11. Reduce 2 to fourths. $2 = \frac{}{4}$
12. Reduce $\frac{8}{4}$ to wholes. $\frac{8}{4} =$
13. Reduce $\frac{2}{3}$ and $\frac{3}{4}$ to 12ths. $\frac{2}{3} = \frac{}{12}$ $\frac{3}{4} = \frac{}{12}$
14. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ to 6ths. $\frac{1}{2} = \frac{}{6}$ $\frac{1}{3} = \frac{}{6}$

15. When the number that is the numerator of a fraction is $\frac{2}{3}$ as large as the number that is the denominator of the same fraction, the fraction is —— —— or it is equal to —— ——. $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$, etc.

*16. When the number that is the numerator of a fraction is —— —— as large as the number that is the denominator of the same fraction, the fraction is —— ——, or it is equal to —— ——.

***To the Pupil.—Read this statement several times, each time putting a different number in the place of the first blanks.**

1. $8\frac{1}{4}$ pecks $+$ $3\frac{7}{8}$ pecks $=$
2. $7\frac{7}{8}$ pecks $-$ $2\frac{1}{2}$ pecks $=$
3. $\frac{5}{8}$ pecks $\times 2 =$ $3\frac{5}{8}$ pecks $\times 2 =$
4. 8 pecks $\times \frac{3}{4} =$ * 8 pecks $\times 3\frac{3}{4} =$ *
5. $\frac{1}{8}$ peck $\times \frac{1}{2} =$ * $\frac{1}{8}$ peck $\times 4\frac{1}{2} =$ *
6. $\frac{5}{8} \div \frac{1}{16}$ * I can change ————————
7. $6 \div \frac{2}{3}$ * I can change ————————
8. $\frac{2}{3} \div 3$ * $\frac{1}{3}$ of ————————

9. In one peck there are —— quarts; in one bushel there are —— pecks; in one bushel there are —— quarts.

10. Reduce $2\frac{1}{2}$ pecks to quarts. $2\frac{1}{2}$ pecks equal —— quarts.

11. Reduce 25 quarts to pecks. 25 quarts equal —— and —— —— pecks.

12. Henry lives $\frac{1}{2}$ of a mile from the school and he goes home for his dinner; in going to and from school he travels in one week —— miles.

13. Alfred's slate cost 20¢; this was $\frac{2}{3}$ as much as his book cost; his book and slate together cost —— cents.

14. Reuben is 12 years old; Sarah is 1 year more than $\frac{2}{3}$ as old; Sarah is —— years old.

15. If to $\frac{3}{4}$ of 12 dollars I add 5 dollars, the sum is —— dollars.

SLATE WORK.

$\frac{11}{24} + \frac{3}{8}$ $\frac{11}{24} - \frac{3}{8}$ $\frac{11}{24} \div \frac{3}{8}$

$\frac{7}{24} + \frac{1}{6}$ $\frac{7}{24} - \frac{1}{6}$ $\frac{7}{24} \div \frac{1}{6}$

$\frac{5}{24} + \frac{1}{8}$ $\frac{5}{24} - \frac{1}{8}$ $\frac{5}{24} \div \frac{1}{8}$

---

*Tell the meaning of the expression *before completing the statement*.

8 twelves = 96. **10 tens = 100.**

1. Ninety-six is —— twelves. 7 twelves =
2. One hundred is —— tens. 9 tens =
3. 96 is —— tens and ——. 8 tens =
4. 96 is —— nines and ——. 9 nines =
5. 100 is —— twelves and ——. 6 twelves =

6. 96 inches is —— feet. 7 feet =
7. 100 inches are —— feet and —— inches.
8. 100 inches are —— and —— —— feet.

9. One eighth of 96 is ——. 7 is $\frac{1}{8}$ of ——.
10. Three eighths of 96 are ——. 9 is $\frac{3}{8}$ of ——.
11. One eighth of 97 is —— and —— ——.
12. One eighth of 100 is —— and —— ——.

13. The quotient of 97 divided by 12 is ——.
14. The quotient of 98 divided by 12 is ——.
15. The quotient of 99 divided by 12 is ——.
16. The quotient of 100 divided by 12 is ——.
17. The quotient of 100 divided by 8 is ——.
18. 12 is contained in 101 —— and —— —— times.
19. 12 is contained in 102 —— and —— —— times.
20. 12 is contained in 103 —— and —— —— times.
21. 8 is contained in 97 —— and —— —— times.

SLATE WORK.

224 pounds   224½ pounds   225 pounds
7½   7   7½

5 pounds)135 pounds   5)145 pounds   5)155½ pounds

Review page 80.

FOR DRILL.

Read rapidly (1) by column downwards, (2) by column upwards, and (3) by line. Continue this drill until each pupil can read the table by line *in two minutes or less.*

7 times 6 are ——.
7 times 7 are ——.
7 times 8 are ——.
7 times 9 are ——.
7 times 10 are ——.
8 times 5 are ——.
8 times 6 are ——.
8 times 7 are ——.
8 times 8 are ——.
8 times 9 are ——.
8 times 10 are ——.
9 times 4 are ——.
9 times 5 are ——.
9 times 6 are ——.
9 times 7 are ——.
9 times 8 are ——.
9 times 9 are ——.
9 times 10 are ——.

7 tens are ——.
7 nines are ——.
7 eights are ——.
7 sevens are ——.
7 sixes are ——.
8 tens are ——.
8 nines are ——.
8 eights are ——.
8 sevens are ——.
8 sixes are ——.
8 fives are ——.
9 tens are ——.
9 nines are ——.
9 eights are ——.
9 sevens are ——.
9 sixes are ——.
9 fives are ——.
9 fours are ——.

Add.	**Subtract.**	**Multiply.**	**Divide.**	**Divide.**
$324\frac{3}{4}$ $275\frac{5}{8}$	$437\frac{2}{3}$ $162\frac{2}{9}$	$148\frac{2}{3}$ 6	$\$3)\$525$	$3)\$528$
$\frac{3}{5}$ $\frac{2}{3}$	$\frac{4}{5}$ $\frac{1}{3}$	$\frac{7}{8}$ 7	$\frac{1}{10})\frac{3}{5}$	$2)\frac{3}{5}$

Teach the meaning and use of the following terms: integer, mixed number, proper fraction, improper fraction.

1. Any number not a fraction is called an *integer.* Six is an ——. Three fourths is a fraction. 8 is an ——. $\frac{2}{5}$ is a ——. 44 is an ——. $\frac{11}{24}$ is a ——.

2. An integer and a fraction together are called a *mixed number* $3\frac{1}{2}$ is a —— ——. 7 is an ——. $\frac{4}{5}$ is a ——. $11\frac{2}{3}$ is a —— ——.

3. A fraction that is less than *one whole* is called a *proper fraction.* A fraction that is equal to *one whole* or to more than *one whole* is called an *improper fraction.* $\frac{3}{4}$ is a —— ——. $\frac{4}{4}$ is an—— ——. $\frac{6}{4}$ is an —— ——. $4\frac{3}{4}$ is a —— ——.

FOR DRILL.*

8 is ——. $\frac{5}{6}$ is ——. $8\frac{2}{3}$ is ——. $\frac{11}{5}$ is ——.
$9\frac{3}{5}$ is ——. 12 is ——. $\frac{13}{8}$ is ——. $\frac{2}{7}$ is ——.
$\frac{11}{4}$ is ——. $8\frac{4}{5}$ is ——. $\frac{4}{7}$ is ——. 9 is ——.
$\frac{5}{6}$ is ——. 7 is ——. $5\frac{4}{5}$ is ——. $\frac{8}{8}$ is ——.
15 is ——. $\frac{4}{7}$ is ——. $\frac{11}{10}$ is ——. $9\frac{1}{4}$ is ——.

4. Reduce $3\frac{1}{2}$ to an improper fraction. $3\frac{1}{2} = \frac{\quad}{2}$
5. Reduce $\frac{17}{4}$ to a mixed number. $\frac{17}{4} =$
6. Reduce $7\frac{3}{5}$ to an improper fraction. $7\frac{3}{5} = \frac{\quad}{5}$
7. Reduce $\frac{14}{5}$ to a mixed number. $\frac{14}{5} =$
8. Reduce $\frac{3}{5}$ and $\frac{1}{3}$ to 15ths. $\frac{3}{5} = \frac{\quad}{15}$ $\frac{1}{3} = \frac{\quad}{15}$
9. Reduce 3 ft. 4 in. to inches. 3 ft. 4 in. = —— inches.
10. Reduce 5 yd. 2 ft. to feet. 5 yd. 2 ft. = —— feet.

***To the Pupil.—Can you make the twenty statements as suggested in the drill, in thirty seconds?**

1. $7\frac{1}{10}$ dollars + $5\frac{1}{5}$ dollars =
2. $8\frac{2}{5}$ dollars − $2\frac{1}{10}$ dollars =
3. $\frac{2}{5}$ dollars × 3 = $4\frac{2}{5}$ dollars × 3 =
4. 7 dollars × $\frac{1}{2}$ = *   \$7 × $3\frac{1}{2}$ = *
5. $\frac{1}{2}$ dollar × $\frac{1}{5}$ = *   \$$\frac{1}{2}$ × $4\frac{1}{5}$ = *
6. $\frac{7}{8} \div \frac{1}{4}$ *   I can change ————————
7. $5 \div \frac{2}{5}$ *   I can change ————————
8. $\frac{1}{2} \div 3$ * $6\frac{1}{2} \div 3 =$

9. Reduce $12\frac{2}{3}$ to an improper fraction. $12\frac{2}{3} = \frac{\ }{3}$
10. Reduce $\frac{35}{8}$ to a mixed number. $\frac{35}{8} =$
11. Reduce $\frac{40}{5}$ to an integer. $\frac{40}{5} =$
12. Reduce $\frac{1}{5}$ and $\frac{1}{4}$ to 20ths. $\frac{1}{5} = \frac{\ }{20}$ $\frac{1}{4} = \frac{\ }{20}$
13. Reduce 18 pints to quarts. 18 pints = —— qt.
14. Reduce 16 pints to gallons. 16 pints = —— gal.
15. Reduce $4\frac{1}{2}$ gallons to quarts. $4\frac{1}{2}$ gallons =
16. Reduce $2\frac{1}{2}$ feet to inches. $2\frac{1}{2}$ feet =
17. Reduce 17 inches to feet. 17 inches =

18. From the 6th day of February to the 14th, it is —— days; if the 6th was Monday the 14th was ——.

19. The number that is the denominator of the fraction I have in mind, is six times as large as the number that is the numerator; the fraction is —— —— or it is equal to —— ——.

SLATE WORK.

$\frac{13}{24} + \frac{1}{8}$

$\frac{13}{24} + \frac{3}{8}$

$\frac{13}{24} + \frac{1}{6}$

$\frac{13}{24} - \frac{1}{8}$

$\frac{13}{24} - \frac{3}{8}$

$\frac{13}{24} - \frac{1}{6}$

$\frac{13}{24} \div \frac{1}{8}$

$\frac{13}{24} \div \frac{3}{8}$

$\frac{13}{24} \div \frac{1}{6}$

---

*Tell the meaning of the expression *before completing the statement.*

Teach the pupil to read and to write all numbers that can be represented by figures of the first four orders.

TO BE WRITTEN IN FIGURES.

1. One thousand two hundred fifty-three.
2. Two thousand six hundred forty-seven.
3. Three thousand one hundred twenty-nine.
4. Four thousand two hundred seventy-five.
5. Five thousand six hundred eighty-six.

TO BE READ BY LINE.

6.	6742	8275	3752	1436
7.	1440	2320	1650	2730
8.	2600	4500	3200	1300
9.	6000	4000	2000	7000
10.	7001	8002	9003	4004
11.	5022	6024	3046	4027
12.	4220	3330	7250	5260
13.	325	642	734	652
14.	605	403	602	504
15.	700	600	800	300
16.	67	86	45	38
17.	1257	2346	3465	3274

WRITE IN FIGURES AND ADD.

18. One hundred seventy-five, and three hundred forty-six.
19. Four hundred thirty-six, and two hundred seventy-four.
20. Two hundred eighty-six, and eighty-two.
21. Six hundred forty-two, and ninety-two.

SLATE WORK.

1. Add one thousand three hundred fifty-five, and two thousand two hundred forty-six.

2. From six thousand five hundred thirty-six, subtract one thousand three hundred twenty-two.

3. Multiply three thousand one hundred forty-two by 2.

4. Divide four thousand six hundred twenty bushels by 2 bushels.

5. Divide three thousand five hundred thirty bushels by 2.

6. Find the sum of two thousand seven hundred, and five thousand forty-five.

7. Find the difference of four thousand three hundred fifty-four, and one thousand thirty-seven.

8. Find the product of two thousand one hundred thirty-nine and 4.

9. Find the quotient of five thousand sixty-five dollars divided by four dollars.

10. Find the quotient of six thousand seventy-two dollars divided by 4.

11. Add $275, $364, and $126.
12. From $2364 subtract $623.
13. Multiply $506 by 6.
14. Divide $3252 by $6.
15. Divide $3252 by 6.

16. Find the sum of 324 and 542 and multiply it by 4.

17. Find the difference of 6240 and 2475 and multiply it by 2.

In the oral solution of a problem, especially when a model is given by the teacher, the thought of the pupil is often occupied with the *mere words employed*, and his work becomes mechanical. It is more difficult to *think and talk* than it is to think without talking. Hence the formal analysis of such problems as appear upon this page, has been deferred until the thought of the pupil has been exercised upon them many times. As a further preparation for the work that follows, the pupil may now be required to *express his thought* in the solution of such problems, and for this purpose, words may be selected for him with little danger that they will be to him empty symbols. He should now be able to *think and talk.*

Teach the meaning and use of the word **analyze**.

1. Two thirds of 18 are how many? Two thirds of 18 are ——. ANALYZE. *One* third of 18 is ——; *two* thirds of 18 are two times —— or ——.

2. Eighteen is two thirds of what number? Eighteen is two thirds of ——. ANALYZE. If 18 is *two* thirds of the number, *one* third of it is one half of 18 or ——; if —— is *one* third of the number, *three* thirds (the whole of it) are three times ——, or ——.

Using the foregoing as models, require the pupil to solve and analyze the following examples.

3. Two thirds of twelve are how many?
4. Twelve is two thirds of what number?

5. Three fourths of twelve are how many?
6. Twelve is three fourths of what number?

7. Two fifths of ten are how many?
8. Ten is two fifths of what number?

9. Three fifths of twenty are how many?
10. Eighteen is three fifths of what number?

11. Two sevenths of fourteen are how many?
12. Fourteen is two sevenths of what number?

13. Three eighths of twenty-four are how many?
14. Twenty-four is three eighths of what number?

15. Six quarts are how many pints? 6 quarts are —— pints. ANALYZE. 1 quart is —— pints; 6 quarts are 6 times —— pints, or —— pints.

16. Six pints are how many quarts? 6 pints are —— quarts. ANALYZE. 2 pints are one quart; 6 pints are as many quarts as 2 pints are contained times in 6 pints. 2 pints are contained in 6 pints —— times.

Solve and analyze the following examples.

17. Twelve yards are how many feet?
18. Twelve feet are how many yards?

19. Five feet are how many inches?
20. Thirty-six inches are how many feet?

---

21. At 5¢ each, how much will 6 pencils cost? They will cost —— cents. ANALYZE. If 1 pencil costs 5¢, 6 pencils will cost 6 times 5¢, or —— cents.

22. If 1 melon costs 10¢, how many melons can I buy for 30¢? I can buy —— melons. ANALYZE. If 1 melon costs 10¢, I can buy as many melons for 30¢ as 10¢ is contained times in 30¢; 10¢ is contained in 30¢ —— times.

Solve and analyze the following examples.

23. At $5 each, how much will 8 barrels of flour cost?

24. If 1 ton of coal costs $6, how many tons can I buy for $24?

25. At 8¢ a yard, how much will 6 yards of muslin cost?

26. If 1 yard of muslin costs 7¢, how many yards can I buy for 35¢?

27. If 3 oranges cost 6¢, how much will 5 oranges cost? They will cost —— cents. ANALYZE. If 3 oranges cost 6¢, 1 orange costs $\frac{1}{3}$ of 6¢ or —— cents; if 1 orange costs —— cents, 5 oranges cost 5 times —— cents, or —— cents.

Solve and analyze the following examples.

28. I paid 12¢ for 3 yards of ribbon; at the same rate what must I pay for 5 yards?

29. John earns $8 in 4 days; how much does he earn in 3 days?

MISCELLANEOUS PROBLEMS.

The problems in coarse type should be solved without the aid of a pencil; those in fine type are for the slate.

1. (a) Two thirds of 15 bushels are —— bushels.
   (b) Two thirds of 639 bushels are —— bushels.

2. (a) Sixteen bushels are $\frac{2}{3}$ of —— bushels.
   (b) Four hundred sixty-six bushels are $\frac{2}{3}$ of —— bushels.

3. (a) Two pounds are —— ounces.
   (b) Nine pounds are —— ounces.

4. (a) Twelve quarts are —— gallons.
   (b) Two hundred fifty-two quarts are —— gallons.

5. (a) At $8 an acre, 5 acres of land are worth —— dollars.
   (b) At $235 an acre, 6 acres of land are worth —— dollars.

6. (a) If 1 melon costs 8¢, with 24¢ I can buy —— melons.
   (b) If 1 ton of coal costs $8, with $344 I can buy —— tons of coal.

7. (a) When 5 oranges cost 20¢, 8 oranges cost —— cents.

(b) When 3 tons of hay cost $48, 8 tons cost —— dollars.

8. (a) James paid 15¢ for 5 lemons; at the same rate, for 24¢ he can buy —— lemons.

(b) James's father paid $24 for 4 barrels of flour; at the same rate, for $324 he can buy —— barrels of flour.

9. (a) The cost of 2 pounds of butter at 20¢ a pound is —— cents.

(b) The cost of 7 pounds of butter at 36¢ a pound is —— cents, or —— dollars and —— cents.

10. (a) Eight gallons are $\frac{2}{3}$ of —— gallons.

(b) Forty-six gallons are $\frac{2}{3}$ of —— gallons.

11. (a) Three sheep at $7 each cost —— dollars.

(b) Seven horses at $155 each cost —— ——.

12. (a) When apples cost $2 a barrel, with $12 I can buy —— barrels.

(b) When apples cost $3 a barrel, with $255 I can buy —— barrels.

13. (a) A grocer buys butter at 20c a pound and sells it for 25¢ a pound; his gain on 3 pounds is —— cents.

(b) A grocer buys apples at 45¢ a peck and sells them at 60¢ a peck; his gain on 8 pecks is —— cents.

14. (a) When 3 acres of land are worth $30, 1 acre is worth —— dollars.

(b) When 6 acres of land are worth $870, 1 acre is worth —— dollars.

15. (a) To build the chimney for my store, 8 hundred bricks will be required; I already have 5 hundred bricks; I must purchase —— hundred more.

(b) To build the chimney for my house, 2150 bricks are required; I already have 1240 bricks; I must purchase —— more.

16. (a) Willie Jones had 2 pieces of rope; one piece was 10 feet long; the other was 2 yards long; together they were —— feet long.

(b) Willie's father built 2 fences; one fence was 145 feet long; the other was 9 yards long; together they were —— feet long.

17. (a) Thirty-two quarts are —— pecks.

(b) Two hundred fifty-six quarts are —— pecks.

18. (a) Fifteen oranges are $\frac{3}{4}$ of —— oranges.

(b) Three hundred forty-two oranges are $\frac{3}{4}$ of —— oranges.

19. (a) Reduce 2 lb. 4 oz. to ounces. 2 lb. 4 oz. =

(b) Reduce 9 lb. 8 oz. to ounces. 9 lb. 8 oz. =

20. (a) When eggs are 8¢ a dozen, for 72¢ I can buy —— dozen.

(b) When eggs are 8¢ a dozen, for 272¢ I can buy —— dozen.

21. (a) One half of 19 dollars is —— dollars.

(b) One half of 527 dollars is —— dollars.

22. (a) Mary has a rectangular flower bed 2 feet wide; it is twice as long as it is wide; it is —— feet long; the distance around it is —— feet.

(b) Mary's father has a rectangular garden 65 feet wide; it is twice as long as it is wide; it is —— feet wide; the distance around it is —— feet.

23. (a) The sum of ⅔ and ¾ is ——.

(b) The sum of 246⅔ and 573¾ is ——.

24. (a) The difference of ⅘ and ⅓ is ——.

(b) The difference of 865⅘ and 146⅓ is ——.

25. (a) The product of 6 multiplied by 4½ is ——. (Tell the meaning.)

(b) The product of 658 multiplied by 4½ is ——.

26. (a) The quotient of $13 divided by $4 is ——. (Tell the meaning.)

(b) The quotient of $651 divided by $4 is ——.

27. (a) The quotient of $12½ divided by 4 is ——. (Tell the meaning.)

(b) The quotient of $652½ divided by 4 is ——.

28. (a) Nathan lives 2½ miles north of the Chicago post-office; his cousin lives 2¾ miles south of it; from Nathan's home to his cousin's it is —— miles.

(b) Walter lives 175 miles north of Springfield; his cousin lives 146 miles south of Springfield; from Walter's home to his cousin's it is —— miles.

29. (a) A farmer had 15 cows; he sold ⅓ of them; he had —— cows left.

(b) A farmer had 723 sheep; he sold ⅓ of them; he had —— sheep left.

30. (a) If 6 yards of ribbon cost 18¢, 12 yards will cost —— cents.

(b) If 2 tons of coal cost $18, 40 tons will cost —— dollars.

REVIEW.

DRY MEASURE.

2 pints are 1 quart.
8 quarts are 1 peck.
4 pecks are 1 bushel.

LINEAR MEASURE.

12 inches are 1 foot.
3 feet are 1 yard.

LIQUID MEASURE.

2 pints are 1 quart.
4 quarts are 1 gallon.

AVOIRDUPOIS WEIGHT.

16 ounces are 1 pound.

TIME.

January has 31 days.
February has ——— days.
March has 31 days.
April has 30 days.
May has 31 days.
June has 30 days.
July has 31 days.
August has 31 days.
September has 30 days.
October has 31 days.
November has 30 days.
December has 31 days.

7 days are 1 week.

Use each of the following terms in a sentence.

add
subtract
multiply
divide
square
oblong

sum
difference
product
quotient
integer
fraction

reduce
numerator
denominator
analyze
rectangular
divided by

mixed number
proper fraction
improper fraction
multiplied by
division
partition

Use each of the following signs and abbreviations in a written statement.

+, −, ×, ÷, =, pt., qt., pk., bush., ft., yd., ¢, $,
oz., lb., gal.

DRILL TABLE.

	A	B	C	D	E
1.	25	53	275	451	728
2.	34	64	364	524	835
3.	43	75	251	643	917
4.	17	87	148	465	746
5.	28	92	236	532	852
6.	36	58	307	618	973
7.	42	71	319	476	764
8.	19	66	190	687	980
9.	40	80	323	590	891
10.	31	99.	282	409	709

1. Add each number in column A to the corresponding number in column B; A + C; A + D; A + E; B + C; B + D; B + E; C + D; C + E; D + E.

2. Subtract each number in column A from the corresponding number in column B; C – A; D – A; E – A; C – B; D – B; E – B; D – C; E – C; E – D.

3. Multiply each number in column A by 2; by 3; by 4; by 5; by 6; by 7; by 8; by 9. Do the same with each of the other columns.

4. Divide each number in column A by 2; by 3; by 4; by 5; by 6; by 7; by 8; by 9. Do the same with each of the other columns.

NOTE.—A sheet containing the answers to the 1000 problems given on this page is furnished for the use of teachers.

To avoid fine, this book should be returned on
or before the date last stamped below

50M—9-40

Tx
511.1
H175r
2

Hall, Frank H. 613426
The arithmetic reader for third grade pupils.

NAME	DATE	NAME	DATE

LIBRARY. SCHOOL OF EDUCATION, STAN

613426

511.1
H175
bk.2

DEPARTMENT OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY